

FLIGHT

The
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AND AIRSHIPS

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DIARY OF CURRENT AND FORTHCOMING EVENTS
Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list—

1930	
Jan. 25	Rugby Football. R.A.F. v. Northampton, at Northampton.
Jan. 30	Rugby Football. R.A.F. v. Leicester, at Leicester.
Feb. 5	Banquet, Royal Aero Club, in conjunction with R.Ae.Soc., Air League of the British Empire, and Soc. Brit. Aircraft Constructors, at Savoy Hotel.
Feb. 6	"Modern Aerodynamical Research in Germany." Lecture by Mr. J. W. Maccoll before R.Ae.S.
Feb. 7	British Empire League Luncheon to Lord Thomson, at British Empire Club, 12, St. James's Square.
Feb. 13	"Recent Work on the Autogiro." Lecture by Senor J. de la Cierva before R.Ae.S.
Feb. 19	"Gliding." Lecture by Dr. Walter Georgii before R.Ae.S.
Feb. 27	"Latest Developments of Aero Engines." Lecture by Mr. A. J. Rowledge before R.Ae.S.
Mar. 5	"Air Co-Operation with Mechanised Forces." Lecture by Wing-Com. T. L. Leigh-Mallory before Royal United Service Institute.
Mar. 6	"Resistance of Air-Cooled Engines and the Townend Ring." Lecture by Maj. F. M. Green and Mr. H. C. H. Townend before R.Ae.S.

EDITORIAL COMMENT



IN the whole of the British Empire there is probably no airway, existing or contemplated, of greater importance than that between Karachi and Calcutta. The former is the airport of India; the latter is the richest commercial city in Asia. With a million and a third of inhabitants, Calcutta is the second largest city in the British Empire and the thirteenth largest city in the world. Its population, however, is a result, not a cause, of its wealth. The said wealth is the result of British commercial enterprise, and the trade of the city is carried on chiefly with Great Britain. It follows that the carriage of mails between Calcutta and London is a matter of first-class importance.

Until a short time ago the fastest way of carrying mails between Great Britain and India was by steamer, and the mail port of India was Bombay. This city is itself of first-class importance. It has a population of 1,173,000, and is the third largest city of the Empire and the sixteenth of the world. Still, it is of less importance than Calcutta, and it is separated from Calcutta by the whole breadth of India. A special mail train takes 30 odd hours to cover the distance between the two cities.

When the mails took some 17 days to travel from Great Britain to India, an extra 36 hours spent on internal distribution did not seem vastly extravagant. The system had the great merit of regularity. It was also the fastest which could be obtained without unreasonable outlay; and the commerce of Calcutta, Bombay, Madras, and Rangoon adapted itself to the limitations of this system.

The institution of an air mail between Great Britain and India opens up new possibilities. India is always slow to adapt herself to novelties. The Babus, or Indian clerks, are devoted slaves of *dāstūr* or custom, and there is an inertia arising from the mass of sentiment of the whole clerical establishment which is apt to defeat European initiative. Kipling wrote about the "fool . . . who tried to hustle the East." None the less, scientific improvements

do forge ahead in spite of Oriental conservatism ; and the air mail will gradually speed up the whole system of Indian commerce. But there is no sense in halving the time of transit on part of the route and dawdling over the last section.

Assuming that aircraft, when once it has achieved absolute regularity, is destined to be the standard mail-carrier between Great Britain and India, the first innovation which it has wrought is the substitution of Karachi for Bombay as the western mail port of India. There is now need to consider distributing lines to Bombay as well as to Calcutta. But Calcutta remains the primary consideration, for the double reason that it is the largest and richest city and that it is on the eastern side of India. In addition, the route from Karachi to Calcutta covers many other cities of some importance. Delhi is the political capital, and Government dispatches deserve special consideration. Cawnpore is a busy manufacturing town. Allahabad and Benares are not without importance. Lucknow, the capital of the United Provinces, is not on the air route but is within easy range of it. Moreover, the next extension on from Calcutta takes one to Rangoon. This Burmese city is itself an important seaport which is at present very badly served in the matter of mails, and it is also a stage on the way to Singapore and Australia. So, while the interests of Bombay and Madras (Madras has 523,000 inhabitants) must not be neglected, there is every reason for giving pride of place to the Karachi-Calcutta airway. It is absurd to bring mails from Croydon to Karachi in six days and then waste some 36 hours in getting them on to Calcutta.

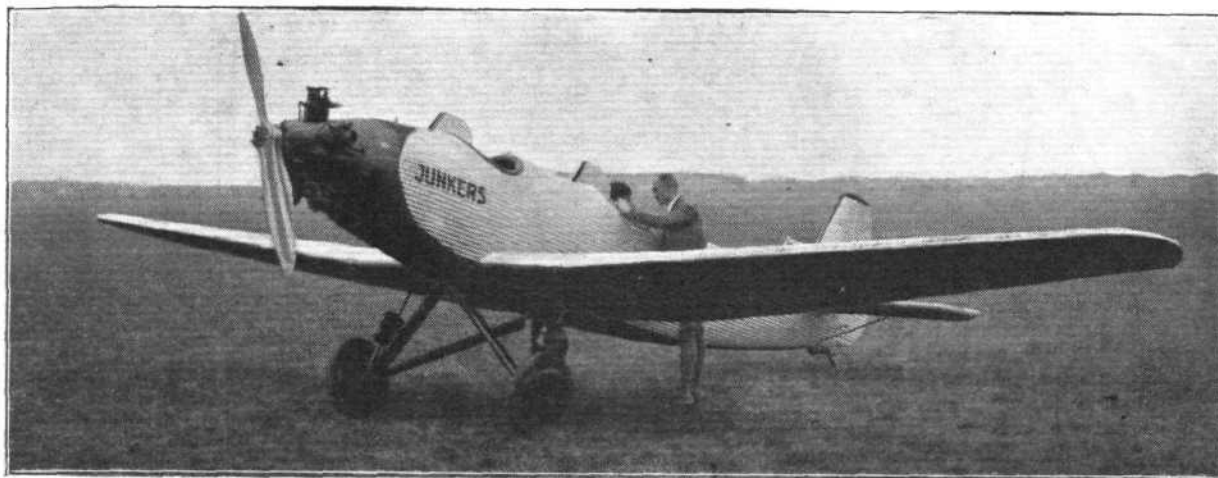
At the beginning of this year the Government of India opened a State airway between Karachi and Delhi. The operation of it is carried out under contract by Imperial Airways. The contract is for two years. This service of some 700 miles is of very little benefit even to the Government secretariat in Delhi. The airway cannot really score sufficiently over the railway until it goes right through to Calcutta, a total distance of some 1,500 miles, and makes use of night flying. Under present arrangements the aeroplane from Baghdad arrives at Karachi some time on a Sunday afternoon, and the mails are flown on the same evening to Hyderabad in Sind. The night is spent there, and the remaining 600 miles to Delhi are flown the next day. The Government of India has now decided to extend its State airway on to Calcutta and Rangoon, and has voted 6 lakhs (£45,000) for completion of ground organisation and purchase of aeroplanes. It is hoped that the section Delhi-Calcutta will be ready for operation before the end of the present year.

There are two points which ought to be emphasized at the outset. The first is that the air service between Karachi and Calcutta ought not to go to bed at nights. The mail should be carried on through the night, and should be delivered in the business offices in Calcutta as early as possible the following morning. Except during the monsoon months (say, from the middle of June to the end of September) this route should be as easy to operate by night as any route in the Empire. There is no rising ground of any importance to be crossed. First the deserts of Sind and Rajputana must be traversed. At Delhi the airway strikes the river Jumna and follows it down to its junction with the Ganges at Allahabad. The Gangetic plain lies from 500 to 1,000 ft. above sea level, but it is as flat as the palm of a hand. It is

mainly arable land, interspersed with patches of scrub jungle. The fields are not bounded by hedges but by *bunds*, or mud ramparts, about 2 ft. high. The country is fairly well supplied with railway lines, running north-west and south-east.

The night-flying route between Karachi and Calcutta, however, will certainly call for special mail 'planes, as few, if any, passengers are likely to be in such a hurry as to continue from Karachi the same evening. Now, as we have frequently pointed out, the mail 'plane can and should be a much more efficient aircraft (in the aerodynamic sense) than the passenger machine. Mails occupy relatively little bulk in proportion to their weight, and this fact gives the aircraft designer an opportunity to produce a really fast machine for the carriage of mails. Moreover, in order that the mails may reach Calcutta first thing Monday morning, a fast type of machine is essential. The distance, via Delhi and Allahabad is approximately 1,500 miles, and to allow for stops en route, either for refuelling or for the transference of mails from one machine to another, a cruising speed of about 150 m.p.h. ought to be aimed at. Accustomed as we are to "mixed" load machines with a speed of 100 m.p.h. or so, this may seem a "tall order." Actually, an examination of the characteristics of certain modern service machines indicates that it should be possible to produce a mail 'plane with a range of some 600 miles (sufficient for the route stages on the Karachi-Calcutta line), cruising at 150 m.p.h., and having a mail capacity of something like 1.5-2 lbs./h.p. With aircraft types having these characteristics, the urgent mails could be transported from Karachi to Calcutta overnight and be distributed in Calcutta by first delivery on the Monday morning.

The second point which should be emphasized is that the extension from Calcutta to Rangoon ought to be a seaplane route. It is true that the hills of Assam and Burma do not come right down to the shores of the Bay of Bengal. But the low-lying strip along the coast is far from favourable for the operation of landplanes. The flight of Southampton boats which surveyed this route in February, 1928, reported that the coast was "picturesque, rugged, and well wooded, with many rivers and bays which appeared suitable for emergency landing places." Owing to mist over the land (and February is one of the finest months in the year in India and Burma) the flight kept out to sea. At Broken Point, near Bassein, it turned inland and made for Rangoon. For the first 20 miles the creeks and rivers were small, but afterwards there were many stretches of water which appeared suitable for landing. On such a route, it seems clear that seaplanes would be much more suitable than landplanes. Some time ago it was announced that the Government of India after considering the possibilities of the Calcutta-Rangoon route, had decided that the use of seaplanes would be too expensive. This decision was probably based on the higher initial cost of flying-boats as compared with landplanes. But the clearing and keeping clear of aerodromes in the tropics would consume most of the saving on the cost of the boats. Seaplanes offer the best service and that should be the ruling consideration. The service cannot be opened for another year, and it is to be hoped that in the meantime the Government of India will not dissipate its none too plentiful resources on extravagant aerodromes in Burma.



THE JUNKERS "JUNIOR"

AMONG the foreign light 'planes exhibited at the Olympia Aero Show last July was the experimental model of the new Junkers "Junior." Since that time exhaustive flying tests have been carried out, and certain minor modifications have been made and incorporated in the production type, which will be put on the market very shortly. The changes are not great, but it is of interest to note that the tare weight figure has been increased from that of 295 kg. (650 lbs.) quoted for the machine at Olympia, to 340 kg. (750 lbs.). In our Olympia Show issue of July 18 we said: "In spite of the fact that it is a cantilever monoplane, the tare weight of the Junkers 'Junior' is but 295 kg. (650 lbs.), a figure low enough to be rather startling, even making allowance for the low weight of the Armstrong Siddeley 'Genet' engine with which the machine is fitted. . . . Exactly where all the structure weight is saved is difficult to see. One assumes, of course, that the machine is designed to the usual D.V.L. load factors."

The fact that the tare weight has gone up to 750 lbs. in the production machine appears to indicate that a strengthening-up process has been gone through, and also possibly some extra weight may have been added in the way of extra comfort for the occupants. It is usual for the production type to be heavier than the experimental model, and no undue significance need be attached to the fact in this case.

The tare weight is still very low compared with British light aeroplanes, and as German aircraft generally is not usually known for lightness, it *would* be interesting to know how such a low structure weight has been attained.

The vexed question, monoplane or biplane, has not by any means been settled yet, nor has the question of whether the high-wing or the low-wing type is likely best to meet the private owner's requirements. It is of interest to recall, however, that in his lecture to the Royal Aeronautical Society, Sqdn.-Ldr. Probyn expressed himself in favour of the low-wing monoplane, voicing rather a preference for one with a cabin. To this extent the Junkers "Junior" does not meet the requirements of this well-known touring private owner-pilot, as it is of the usual open type. With effective windscreens, however, many might prefer the unobstructed view which the Junkers arrangement does undoubtedly give.

With the arrangement of the Junkers "Junior" there is little fault to find. The front cockpit is placed well forward, so that the occupant can look straight down (as, indeed, he is seen doing in the aerial view). The rear cockpit is well aft, and also affords a vertical view of the ground. Between the two cockpits is a luggage locker.

As the machine is of all-metal construction (with the usual Junkers corrugated Duralumin covering of wings and fuselage) the "Junior" does not, it is claimed, need a hangar but can

Length, o.a.	..	7.15 m. (23 ft. 5 in.)
Wing Span	..	10 m. (32 ft. 9½ in.)
Wing Area	..	12.6 sq. m. (136 sq. ft.)
Wheel Track	..	1.83 m. (6 ft.)
Tare Weight	..	340 kg. (750 lbs.)
Pilot	..	75 kg. (165 lbs.)
Passenger	..	75 kg. (165 lbs.)
Petrol and Oil	..	70 kg. (154 lbs.)
Luggage	..	30 kg. (66 lbs.)
Gross Weight	..	590 kg. (1,300 lbs.)
Wing Loading	..	46.5 kg./m. ² (9.55 lbs./sq. ft.)
Power Loading	..	6.7 kg./h.p. (14.8 lbs./h.p.)
"Wing Power"	..	6.98 h.p./m. ² (0.647 h.p./sq. ft.)
Maximum Speed	..	165 km./h. (102½ m.p.h.)
Cruising Speed	..	140 km./h. (87 m.p.h.)
Initial Rate of Climb	..	3.3 m./sec. (650 ft./min.)
Ceiling	..	4,200 m. (13,800 ft.)
Range	..	650 km. (400 miles)
Endurance	..	5 hours.



THE JUNKERS "JUNIOR": In this three-quarter rear view the machine is shown pegged-out, and with covers over cockpits and engine.



The Junkers "Junior" in flight: This photograph gives a good idea of the excellent view obtained from the two cockpits. The engine is an Armstrong Siddeley "Genet."

The luggage locker is placed, in the Junkers "Junior", between the two cockpits.

quite well spend most of its time on the ground pegged-out in the open. Canvas covers for the two cockpits and for the engine are provided, as are also the necessary pegs, etc. One of the photographs shows the machine so pegged out, and with the cockpit and engine covers in place. In this connection it should be recollected that the machine is not provided with folding wings, and that therefore it occupies a fairly large space, so that the machine may well require to be left in the open where a machine with folding wings would be housed.

Having gone into production, it appears likely that the Junkers "Junior" will be taking part in considerable numbers in the round-Europe contest which Germany is organising this coming summer as a result of a German pilot having won first place in the contest last year. There will then be an opportunity to see how it compares with British light 'planes of somewhat the same power, and of which it is hoped that a fairly large number will take part.



ROYAL AERO CLUB

(Official Notices)

Royal Aero Club Banquet.—The Royal Aero Club Banquet will be held at the Savoy Hotel on Wednesday, February 5, 1930. H.R.H. The Duke of York has graciously consented to be present.

The Banquet is held in conjunction with the Royal Aeronautical Society, Air League of the British Empire, and the Society of British Aircraft Constructors. Members of these societies wishing to attend are requested to make application for tickets to the Royal Aero Club, 3, Clifford Street, W.1. The price of tickets (exclusive of wines, etc.) is £1 1s.

International Touring Competition for Light Aeroplanes.—A conference was held in Paris on January 17

last to draw up the regulations for this year's contest. The Royal Aero Club was represented by Lieut.-Col. M. O'Gorman, C.B., Major C. J. W. Darwin and H. E. Perrin.

The contest will be organised by the Aero Club of Germany (last year's winner), and the course will be approximately 7,000 km., with landing places in most of the European countries. There will be two controls in England, Bristol and London. The contest will be held during the latter part of July.

Offices: THE ROYAL AERO CLUB
3, CLIFFORD STREET, LONDON, W.1.
H. E. PERRIN, Secretary



THE "GLOSTER" A.S.31

Air Survey Machine Fitted with Various Engines

REFERENCE has been made on several occasions to the "Gloster" Air Survey machines, one of which was exhibited in skeleton at the Olympia Aero Show. The Aircraft Operating Co. is using one of these machines, as recorded in FLIGHT recently, but the A.S. 31 can be used for a variety of other purposes if desired. With a high performance and, more particularly, a great reserve of power, the machine should be useful as a passenger or mail carrier, or for a fast goods service. The fact that the machine is fitted with two instead of three engines need not necessarily be a valid objection to its use. In this country it has come to be regarded as almost a matter of course that commercial aircraft must be fitted with three separate power plants, but in other countries the same principle has not been accepted, and in the United States, for instance, very good regularity of service has been achieved with single-engined mailplanes. In the "Gloster" A.S. 31 the power reserve is such that the machine is definitely able to fly on one engine. This is, of course, merely another way of saying that normally it is cruising with its two engines well throttled down, so that the reliability should be extremely good. In fact, for air survey work it is essential to have this reliability, as very often the work is carried out over country where it is not possible to make forced landings with safety.

The A.S. 31 was originally designed for Bristol "Jupiter" engines, and the example in use by the Aircraft Operating Co. is fitted with these engines. If desired, however, other engines can be installed, and the "Gloster" technical staff has worked out performance figures for the machine when fitted with the Bristol "Jupiter" XI F, the Armstrong Siddeley "Jaguar" Major and "Jaguar VI," the Pratt & Whitney "Hornet," the Lorraine-Dietrich 14 AC, and the Wright "Cyclone." These performance figures have been calculated from the actual performance figures, and will probably be found quite accurate enough for all practical purposes. The actual test figures with the "Jupiter" XI F are given first, and these have served as the basis for calculating the others, while they also enable a comparison to be made.

As all the types of engine for which estimated performance figures are given are of the radial air-cooled type, the changes necessary in installation and mounting should be very small, and the appearance of the machine should in all cases approach very closely to that of the original, which is shown in the accompanying FLIGHT photograph.

Outstanding characteristics of the "Gloster" A.S. 31, fitted with all types of engine, are a very high rate of climb and an exceptionally wide speed range. For instance, the initial rate of climb with the "Jupiter" XI F engines was 1,740 ft./min. (8.8 m. per second), and is correspondingly smaller or greater with the other types of engine. If it is recalled that a few years ago this would have been regarded as a very good rate of climb for a single-seater fighter, while

Engine.	"Jupiter" Type XI F.	"Jaguar" Major	"Jaguar" Type VI	Pratt & Whitney "Hornet."	Lorraine Dietrich 14 ac.	Wright "Cyclone"
Normal r.p.m.	2,000	2,000	2,000	1,900	1,700	1,900
" b.h.p.	490	510*	468*	500*	499*	535*
Gear ratio	0.5/1	0.657/1	0.657/1	0.5/1	DD	DD
Wing area . . . sq. ft.	1,025	1,025	1,025	1,025	1,025	1,025
Survey load . . . sq. m.	95.2225	95.2225	95.2225	95.2225	95.2225	95.2225
and crew . . . lb.	916	916	916	916	916	916
Oil lb.	296	296	296	296	296	296
Fuel lb.	1,820	1,820	1,820	1,820	1,820	1,820
Total disposable load . . . lb.	3,032	3,032	3,032	3,032	3,032	3,032
All-up weight . . . lb.	8,842	8,832	8,782	8,960	8,922	8,744
Airscrew dia. . . ft. in.	12 0	11 3	11 0	12 0	9 6	9 6
	m. 3.6576	3.4290	3.3528	3.6576	2.8956	2.8956

Performance

Max. speed . . . m.p.h.	140	139	136	141	133	136
near ground . . . km./h.	225	224	219	226	214	219
At 5,000 ft. . . m.p.h.	137	143	132	138	129	133
(1,525 m.) . . . km./h.	220	229	213	223	207	214
At 10,000 ft. . . m.p.h.	133	140	127	134	124.5	128
(3,050 m.) . . . km./h.	214	225	204	215	200	205
At 15,000 ft. . . m.p.h.	127	134	121	128	116.5	120.5
(4,575 m.) . . . km./h.	204	215	195	205	187	194
At 20,000 ft. . . m.p.h.	118	125	112	118.5	—	—
(6,100 m.) . . . km./h.	190	201	180	190	—	—

Rate of Climb

Near ground . . . ft./min.	1,740	1,620	1,540	1,810	1,300	1,440
At 5,000 ft. . . m./min.	530	493	469	552	396	439
(1,525 m.) . . . ft./min.	1,320	1,470	1,120	1,390	900	1,030
At 10,000 ft. . . m./min.	402	448	341	423	274	314
(3,050 m.) . . . ft./min.	950	1,070	790	1,000	570	680
At 15,000 ft. . . m./min.	290	326	241	304	173	207
(4,575 m.) . . . ft./min.	590	710	460	620	280	360
At 20,000 ft. . . m./min.	180	216	140	189	85	109
(6,100 m.) . . . ft./min.	240	340	150	250	—	—
	73	103	46	76	—	—

Time to Height (Minutes)

5,000 ft.	3.4	3.2	4	3.2	4.7	4.2
(1,525 m.)	7.7	7.1	9.2	7.4	4.6	10.2
10,000 ft.	14.3	12.8	16.6	13.8	23.6	20
(3,050 m.)	27	22.8	34.6	23.7	—	—
15,000 ft.	22,000	23,600	20,900	22,200	18,000	19,200
(4,575 m.)	6,705	7,193	6,370	6,766	5,486	5,852
20,000 ft.	23,500	25,000	22,500	23,700	19,800	20,800
(6,100 m.)	7,162	7,620	6,860	7,223	6,035	6,340
Service ceiling . . ft.	22,000	23,600	20,900	22,200	18,000	19,200
Absolute ceiling . ft.	6,705	7,193	6,370	6,766	5,486	5,852
	m. 23,500	25,000	22,500	23,700	19,800	20,800
	m. 7,162	7,620	6,860	7,223	6,035	6,340

Range and Speed

At 5,000 ft. . . miles	580	590	590	580	500	500
(1,525 m.) . . . m.p.h.	115	115	115	115	115	115
At 20,000 ft. . . km.	928	944	944	928	800	800
(6,100 m.) . . . km./h.	184	184	184	184	184	184
Absolute ceiling . ft.	10,000	10,000	6,000	10,500	5,500	8,000
Stalling speed . . m.p.h.	45	45	45	45	45	45
	km./h. 72	72	72	72	72	72

* Normal power at 3,000 ft. (1,000 m.)

Note.—All performances are based on airscrews designed to give maximum permissible engine revolutions in full throttle level flight, and normal revs. on climb or cruising.

it is here achieved with a real commercial machine, it is seen that the A.S. 31 is a rather remarkable aircraft.

If one turns to the figures for maximum and stalling speeds, it is found that the speed range is no less than 3.1 to 1, which again is a very good figure indeed.

The total disposable load is 3,032 lb., and as this can be divided into any desired proportion of fuel load to useful load, the machine could be used for a variety of ranges other than those shown in the table, the useful load varying inversely.

THE TWO-CYCLE AERO ENGINE

By C. F. CAUNTER

IN an article under the above heading it may as well be made clear at once that the remarks embodied herein do not apply to the large two-cycle aero engine. It is very definite, at least at the present period of progress, that the air-cooled two-cycle cylinder of over a certain limiting size breeds difficulties that at the outset are discouraging. The chief of these is that it overheats badly, and the only successful form that this type of engine has attained so far is the large, moderately slow speed, water-cooled Diesel engine, and it may be emphasised here that in this form it is very successful indeed. The large two-cycle aero engine, however, is a different matter altogether; and although scientific research may produce a successful application of the principle in this branch of aeronautics later on, especially in the crude oil form, yet meanwhile the four-cycle principle is supreme, and will be so for many years to come, perhaps until both two and four-stroke principles are eliminated by the perfected prime mover of the future.

The small air-cooled, high-speed, two-cycle engine has, however, been very successful for many years as a power unit for motor cycles, and this very searching test is, to the writer's mind, a great promise of what this type of engine might really be made to do under the influence of proper development and scientific research. For one of the greatest drawbacks of the two-stroke is that it has not been subjected to the searching experiments and tests as has the four-stroke. Consequently the drawbacks of the latter have been overcome, whereas those of the former still bar the way to success, and leave it still an unproven idea. The popularity of motor cycling combined with the cheapness of manufacture of the simple two-stroke engine brought the type to a certain degree of commercial efficiency, and this development, scant though it has been, has yet enabled it to become a standard power unit for small motor cycles. Yet what still remains to be done in this direction far outweighs what has already been done.

The high-speed air-cooled two-stroke engine, then, holds out great promise of development if a certain limiting size of cylinder is not exceeded. This limiting size is well known, and lies somewhere in the neighbourhood of 35 to 45 cubic inches of swept volume, which is approximately equivalent to 10 to 12 h.p. at 1,800 to 2,200 r.p.m. It would seem from this, therefore, that although the big two-cycle engine is at present impracticable, yet the chances of developing a light plane field of 40 to 80 h.p. are extremely bright. And since this size of engine supplies a popular and increasing demand as the power units of small sport aircraft, its development would most certainly be justified by its commercial success.

In simple form such as the three, five or seven-cylinder radial, or the three or four-cylinder vertical, the two-cycle aero engine would have the following advantages over similar models of four-stroke design, all of which are very important from the private owner's point of view:—

(1) On account of the simplicity of construction, the manufacturing cost would be substantially less.

(2) The small number of moving parts, all of which are of a robust nature compared with the minute poppet valves, springs, tappet gear and cam gear of the four-stroke, would make for greater reliability.

(3) With good design and proper development, the two-stroke will give greater horse-power size for size, which results in a lighter weight per horse-power.

The aero engine would, also, be working under far more favourable conditions than the motor-cycle unit, which would assist in overcoming some of the inherent difficulties of the two-cycle. The principal of these are as follows:—

(a) The aero engine would run at a fairly constant load and speed. On a motor-cycle the load and speed factors are continually varying.

(b) The air speed available to cool a motor-cycle engine is, under favourable conditions, an average of 25 to 30 m.p.h. The engine has also to be capable of high revolutions on low gear when hill climbing, which means a greater amount of heat generated and less air speed to dissipate it. In the aero engine the crank speed would be very nearly constant, and the air speed past the cylinders would lie between 45 and 80 m.p.h. It would seem from this that the great bugbear of overheating, apart from any improvement in design from this point of view, is possible of being dealt with successfully.

In the writer's opinion, the small two-cycle aero engine should embody the following features as aids in making the type more suitable to aircraft propulsion, and at the same time to overcome some of the inherent drawbacks of the two-stroke engine:—

Cylinders.—These should at least be fitted with aluminium heads, or which is better, be made entirely of aluminium with steel liners. This latter has not, to the writer's knowledge, been attempted in two-cycle engines so far, which is strange, since the arrangement offers a light cylinder with great heat-radiating properties. The inside of the head or combustion chamber should incorporate a convex face which fits into the concave face of the deflector on the piston at the top of the stroke. This is the latest practice and produces greater turbulence of the gases just before ignition, by a squeezing effect as the two faces come together, which is of importance in producing good combustion of the residual exhaust fouled gas.

Piston.—Engines employing the stepped or differential piston offer great possibilities, especially for engines of the radial type where separate crankcase compression is impossible. It is possible too, with this system, to obtain good volumetric efficiency of the charging system by making the pumping bore about 50 per cent. bigger in volume than the working bore. Pistons should be made of aluminium on account of this metal's good cooling properties.

Ignition.—This should be of the dual type, i.e., two plugs per cylinder. It would be interesting to see the increase of power that this arrangement would give in a two-stroke aero engine apart from the reliability that dual ignition provides.

Lubrication.—The two-cycle engine can be efficiently lubricated by the orthodox pump method without having recourse to the primitive oil and petrol mixture.

Carburation.—The engine should be of the forced induction type, i.e., the cylinder should be charged either by differential piston, separate piston, Roots blower, &c., rather than the more simple crankcase compression method which has poor volumetric efficiency.

Exhaust Collector Ring.—It is essential that the exhaust gases be allowed free escape to air with the minimum of back pressure. The question of fitting a collector ring for the exhaust gases on an engine of the radial type presents some difficulties. These can be overcome, perhaps, by employing a series of separate pipes arranged neatly in a form that could be evolved by experiment.

The writer is at present engaged in the construction of an experimental two-cycle aero engine which embodies special arrangements for efficient charging and burnt gas evacuating, which are of a very simple nature and add nothing to the weight or complication of the design. Other features of the engine are differential piston charging (each cylinder charging itself and no outside pipes being used). Straight piston rods with cross slide big ends; aluminium cylinder heads, and 180 degrees of suction in the pumping cylinder when piston is on up stroke (this is obtained by means of simple valves in the crankcase, actuated by a cam mounted directly on the crankshaft). The engine is of the five-cylinder radial type, of 150 cub. ins. swept volume, and calculations and experiments with single cylinder models show that it should be capable of 50 to 55 h.p., at 1,800 to 2,000 r.p.m. This brief specification is an indication of the writer's ideas on the lines that the two-cycle aero engine for light 'planes should be developed.

Apart from present-day progress, the two-cycle aero engine has already been successfully applied in practice in isolated cases, and some of these designs showed very great promise. By far the most important of these are the designs of Mr. J. C. Mort, who founded the New Engine Company in 1909, which existed up to the year 1912 and produced some beautiful examples of two-cycle aero engines. The types produced included two-, four- and six-cylinder vertical, and four- and eight-cylinder Vee, and all employed forced air scavenge and forced gas injection by means of separate Roots blowers. These engines were successfully used in flight, notably by Mr. Alec Ogilvie, and the technical papers of the time comment on their great reliability—and that in a period (1910) when aero engines were anything but reliable. The New Engine Company suddenly died in 1913, however (*Aeronautics* for 1912 has many references and photos of the N.E.C. engines, while the 1913 volume makes no mention of them).

at all) and the sole surviving engine of this type reposes under a glass case in the Science Museum at South Kensington. The author is very definitely of the opinion, however, that the Mort designs were cut off in the very morning of their development by other reasons than the supposed inefficiency of the two-cycle system.

The 6-cyl. Laviator, a rotary with stepped pistons and transfer pipes that transferred the mixture to the cylinder 120 degrees ahead, was developed in France about 1910. Also engines of the vertical type, employing separate crankcase compression to each cylinder, with the number of cylinders varying from 3 to 7 were developed by the Levis Motor Cycle

Company and the Roberts of America. A tabulated list of two-cycle aero engines together with their main characteristics is appended from a point of view of interest. A column of cubic capacities is also included for size comparison.

To the writer's mind the small two-cycle light 'plane engine presents a wonderful field for development, and it is a thousand pities that the two-stroke principle is neglected because it offers some difficulties. With proper research and development the advantages can be made to well outweigh the disadvantages and thus make it a commercial proposition capable of competing very favourably with the four-cycle engine in the particular type that has been outlined.

PARTICULARS OF TWO-CYCLE AERO ENGINES

Engine.	Type.	H.P.	R.P.M.	No. of Cyls.	Bore.	Stroke.	Capacity.	Wt.	Cooling.	Method of Charging.	Year.	Remarks.
					ins.	ins.	cub.ins.	lbs.				
Centrum ..	Radial ..	150	—	6	5.92	5.52	912	—	W.C.	—	1913	—
Fox ..	Vertical ..	45	1,000	3	4	4	151	150	—	—	1914	—
" ..	" ..	60	1,000	4	4	4	201	190	"	—	1914	—
" ..	" ..	90	1,000	6	4	4	302	280	"	—	1914	—
" ..	H.O. ..	60	1,000	4	4	4	201	175	"	—	1914	—
" ..	" ..	90	1,000	6	4	4	302	250	"	—	1914	—
Frederickson ..	Rotary ..	—	—	3	4.5	4.75	237	—	A	D.A. cylinder	1917	American.
" ..	" ..	70	—	5	4.5	4.75	395	—	"	"	1917	"
" ..	" ..	—	—	10	4.5	4.75	790	—	"	"	1917	"
Funck ..	" ..	1	6,000	6	mm. 15	mm. 15	9.75	—	"	Separate cylinder	1914	This was a Belgian model.
Gobe and Diard ..	Radial ..	—	—	—	—	—	—	—	"	—	1911	Co-axial radial.
Irwin ..	" ..	20	—	4	—	—	72	60	"	—	1929	Used on Irwin Meteor-plane."
Lamplough ..	Vertical ..	—	—	4	ins. —	ins. —	—	—	W.C.	Blower	1910	—
" ..	Rotary ..	80	1,000	6	4	5	378	300	A	"	1911	—
Laviator ..	" ..	50	1,200	6	3.94	5.12	375	198	"	Stepped piston	1913	—
" ..	Radial ..	65	1,200	6	3.94	—	375	—	"	"	1913	—
Levis ..	Vertical ..	35	—	5	—	—	—	—	"	Crank-case	1915	Motor cycle cylinders.
Messpa ..	H.O. ..	70	2,400	2	mm. 100	mm. 120	98	176	"	—	1913	—
N.E.C. ..	Vertical ..	20	1,250	2	ins. 3	ins. 4.25	60	—	W.C.	Roots' blower	1909	Employed special scavenge blower.
" ..	" ..	40	1,250	4	3	4.25	120	—	"	"	1909	"
" ..	" ..	80	1,250	6	3.96	4.5	334	290	"	"	1912	"
" ..	" ..	40	1,250	4	3.65	4.5	188	133	"	"	1910	"
" ..	" ..	50	1,250	4	3.65	4.5	188	155	"	"	1911	Used by Alec Ogilvie
" ..	" ..	100	1,250	8	3.65	4.5	377	280	"	"	1911	"
Roberts ..	" ..	—	—	4	—	—	—	—	A	Crank-case	1915	American.
" ..	" ..	—	—	4	—	—	—	—	"	"	1915	"
" ..	" ..	—	—	6	—	—	—	—	"	"	1915	"

R 100

THE airship R 100 has made two trial flights recently. On the 16th inst. she was brought out of her shed and flown at 9 a.m. Flying at 2,000 ft. above clouds, the airship made her way over the Wash. She carried out some speed trials, and it was estimated that she reached a speed of 81 m.p.h. Her engines were not run full out. She moored at Cardington at 10 p.m., and the mooring operation was carried out in 22 minutes.

On Monday, the 20th, the airship made another flight, starting at 9 a.m. She flew over London, and was seen by the delegates to the Naval Conference, who were in the garden of No. 10, Downing Street. She then flew over Aldershot and Oxford, and returned to the mooring tower at 4.30 p.m. The flight was described as quite satisfactory.

Schneider Trophy

REVISED regulations for the Schneider Trophy contest of 1931 are now being drawn up. A meeting of the committee of the Fédération Aéronautique Internationale was held in Paris last week end, when certain proposals put forward by

the Royal Aero Club of Great Britain were discussed. One of these proposals is that the navigability trial and the speed contest shall both be held on the same day. Another is that an entry shall be accompanied by a deposit of 200,000 fr. (about £1,600). The date for the contest is to be between June 1 and September 30.

The French Air Estimates

THE French Air Estimates for 1930 show an increase of 200,000,000 francs (£1,600,000) over those of the previous year. The total air vote amounts to 2,083,611,720 francs (£16,668,893). The fighting services are in need of new and up-to-date types of aircraft, and so a sum of 1,624,171,660 francs (£12,993,373) is to be spent on the services. A sum of 459,440,060 francs (£3,675,520) is devoted to civil flying, and, of this, subsidies to various air lines amount to 210,150,000 francs (£1,681,200). In the matter of subsidies Great Britain may well be astonished at her own moderation. Research and development of new types of aircraft are to receive 100,000,000 francs, and a sum of 3,587,000 francs is to go to propaganda and encouragement of air-mindedness.

THE COMPER VIBRATION ABSORBER

A Neat Little Fitting for Engines of All Sizes

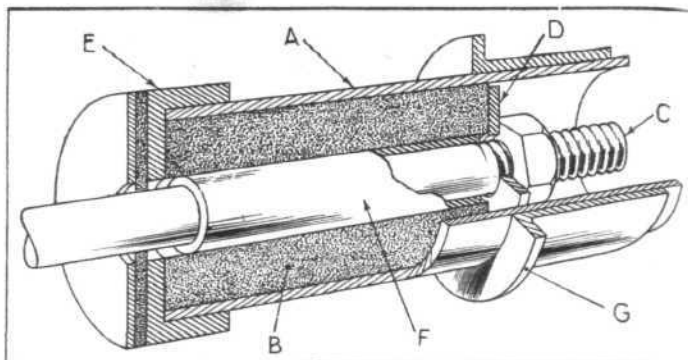
ALTHOUGH the modern aero engine is very much better from the point of vibration than were some of the early engines, many types still show more vibration than is good for the aircraft or conducive to comfort on the part of the occupants. If a rigid engine mounting is employed, the vibrations are transmitted to the fuselage structure, and thence to nearly all parts of the aircraft. Cases are not unknown in which a resonance period was set up, with somewhat serious results. Even if an engine is fairly smooth running, and the vibrations that reach the cockpit, for instance, are not such as to cause discomfort, there is still very good reason for avoiding, as far as possible, any vibrations reaching the fuselage.

Flt.-Lieut. Nicholas Comper has designed a vibration-absorbing unit which, after prolonged tests in one or two of his machines, he has found to answer the purpose admirably. The unit is small, weighs practically nothing, and costs but little. Although designed primarily with radial air-cooled aero engines in view (actually it has so far been tested-out chiefly on an A.B.C. "Scorpion") the Comper anti-vibration unit can be fitted to almost any aero engine. It is shown, more or less diagrammatically, in the accompanying sectioned view. It should be pointed out that the sketch is rather more than "life-size," the unit being quite a small fitting. The number of units to be used in any particular installation will depend upon the engine. The A.B.C. "Scorpion" is normally mounted on its engine plate by means of four bolts. Other engines, such as large radials, would have nine or more. The units, it will be understood, are interposed between the engine and the engine plate.

The Comper vibration-absorption unit consists of a steel cylinder A, which contains a cylindrical block of rubber B. The engine bearer bolt or stud C passes through the centre of the rubber block, and compression is obtained by screwing up the bolt nut on the steel disc or washer D. Since the washer D is of smaller diameter than the inside diameter of

the cylinder A, there is no metallic contact between them. At the crankcase end of the unit, the bolt passes through an oversize hole in a steel cap E, so that the bolt is supported by rubber throughout its length.

The tubular distance piece F serves as a gauge for the correct compression of the rubber block. When fitting the unit to the engine, the retaining nuts are tightened up until the distance piece is in compression, and then slackened off



a turn or two, so as to leave the distance piece with a small amount of end play.

Each unit is attached to the nose bulkhead or engine plate by metal straps or clips, and the flanged sleeve G, which is riveted or bolted to the tubular steel cylinder, takes the thrust through the clips direct to the aircraft frame.

Anyone interested in this device is asked to communicate with the Comper Aircraft Co., Ltd., Hooton Park Aerodrome, Cheshire, from whom full particulars, prices, etc., may be obtained.

DEATH OF WARRANT OFFICER T. DAL MOLIN

IT is with the greatest regret that we learn of the death of Maresciallo (Warrant Officer) Tomaso Dal Molin of the High Speed Flight of the Italian Air Force. On Saturday, January 18, this pilot was testing a racing seaplane off Desenzano on Lake Garda, when the machine suddenly plunged from a low altitude into the water near the island of Sirmione. The seaplane is stated to have been one of those which were brought to Calshot last summer but not used in the Schneider race. At the moment of writing it is uncertain whether it was the Fiat C 29 or the two-engined Savoia-Marchetti S 65 which Dal Molin was flying; but doubtless the crash occurred in practice for an attempt on the world's speed record. It seems to bear a strong resemblance to the crash in which Flight-Lieut. Kinkead lost his life on a similar practice flight, though the actual causes of the two disasters may be very different.

Tomaso Dal Molin was a Venetian, born at Vicenza, and was 28 years old. He qualified for his pilot's certificate in 1922, was appointed to a fighter squadron, and became noted for his aerobatic flying.

He came to Calshot last August with the Italian Schneider



team, and made himself very popular with all British ranks there. Everyone admired his splendid handling of the Macchi 52 seaplane in which Bernardi had established the world's speed record. On one occasion Dal Molin had landed this machine when one of the floats began to fill and the machine seemed likely to capsize. Great efforts on the part of the R.A.F. launches saved it and brought it back to the slipway, where the punctured float was repaired.

Dal Molin flew this same machine in the actual race, and came far nearer to winning the trophy with it than was generally realised. His average speed was 284.20 m.p.h., which gave him second place. Had the disintegrated sparking plug in Waghorn's engine not been discovered the night before, and had it proved impossible to change the bank of cylinders of that engine during the night, Dal Molin would have won the trophy for Italy. As it was, he flew a splendid course, and in no point of piloting was he inferior to Waghorn and D'Arcy Greig.

Another really great pilot has given his life to the cause of aeronautical science. We deeply deplore his loss, but we believe that such sacrifices are not made in vain.

Director of the Naval Air Division

CAPT. C. E. TURLE, D.S.O., is to succeed Capt. I. W. Gibson, O.B.E., M.V.O., as Director of the Naval Air Division, on April 5. Capt. Turle was recently head of the naval mission to Greece.

The French Aero Show

We are reminded by the Chambre Syndicale that the next Paris Aero Show (12^e Exposition Internationale de

l'Aéronautique) will be held in the Grand Palais (Champs Elysées) from November 28 to December 14, 1930, and that exhibitors should send in their application for stand space before May 31. Intending exhibitors who send in their applications before that date will be entitled to priority in the drawing of lots for stands. All communications should be addressed to M. le Commissaire General, at 9, Rue Anatole-de-la-Forge, Paris, (17^e).

LORD WAKEFIELD OF HYTHE

EVERYONE connected with flying, and everyone connected with a great many other activities, knows well the name, Sir Charles Wakefield. It is a name "familiar in their mouths as household words." Everyone who knew that name revered the man who bore it. Everyone of them rejoiced on New Year's Day when H.M. the King, on the advice of the Prime Minister, conferred a peerage on the holder of that name. And now, as a natural consequence, the name of Sir Charles Wakefield will be used no more. Henceforth we must speak of Lord Wakefield of Hythe.

We do not regret the change; we welcome it heartily. We admit, none the less, that we are glad that the familiar and honoured surname of Wakefield is preserved in the new title. We felt no regret when another friend of aeronautics, commonly known as "Jix," became Lord Brentford, even though it takes a slight mental effort to remember how Jix must now be described. It also takes a mental effort to connect another Lord Mayor of London, Sir Richard Whittington, with the world-famous cat-owner, "Dick." But the connection of the flying world with the name Wakefield has been so intimate that we prefer Lord Wakefield to any other possible title.

Charles Cheers Wakefield is a Liverpool man and was educated at the Liverpool Institute. Lancashire has done well in giving to aeronautics such a pioneer as Sir Alliott Roe and such a patron as Lord Wakefield. For such an able business brain the confines of even Lancashire were too narrow. London was the only arena suitable for its activities, and the Lancashire business man was destined to become Lord Mayor of London.

Lord Wakefield became a member of the Corporation of the City of London in 1904. He was Sheriff during 1907-8 and was knighted in 1908. In the same year he became Alderman of the Ward of Bread Street. In 1915, during the war, he became Lord Mayor. In times of stress the office of Lord Mayor of London is particularly strenuous, and Lord Wakefield rose to the responsibilities of his position with typical vigour. He raised large funds to help the Red Cross

of Allied countries, and he made the Mansion House a recruiting station. Very fittingly, he holds the position of Honorary Colonel of the 2nd Battalion, Royal Fusiliers (City of London Regiment). At the end of his term of office Lord Wakefield was made a baronet, and subsequently was granted the C.B.E. (Military Division).

In business, Lord Wakefield's name is, and will always be, chiefly connected with the firm of C. C. Wakefield and Co.,

Ltd., makers of Castrol and other oil products. He founded this firm himself, but his business activities found many other outlets. It was as a result of his business experiences that Lord Wakefield wrote a book, "On Leaving School and the Choice of a Career," which is now in its sixth edition.

Lord Wakefield has been a great philanthropist. Out of his great wealth he has given wisely and generously to help innumerable deserving causes. It would, perhaps, be correct to say that he has preferred to help people to help themselves. Causes which make for the increased prosperity of the British, both at home and in the Dominions, have always made a special appeal to him. He has always been a great Imperialist. Doubtless it was from that point of view that he regarded the growth of aeronautics. In flying he saw a new and wonderful vehicle of Empire commerce. From very early days he became convinced of its future, and he has used his wealth to advance the movement. Space would hardly permit us to recount all that he has done and given to increase the interest of the public in aircraft. He has contributed to the expenses of many great survey and publicity flights, notably those of Sir Alan Cobham. He has entered aeroplanes for the King's Cup and has won it. He has

founded scholarships at Cranwell Cadet College. He has presented light aeroplanes to numerous clubs in this country and overseas. In fact, whenever funds have been needed for a flying enterprise an appeal has nearly always been made to Lord Wakefield, and we have never heard of a case in which that appeal was fruitless. We trust that many more years of generous and useful activities lie before Lord Wakefield of Hythe.



The Patron Saint of Aviation.

R.A.F LONG-DISTANCE FLIGHT

Official Report on Accident

THE Air Ministry announces:—The evidence gained by the Air Ministry officials who went out to investigate the loss of the Long-Distance Monoplane, at Tunis, shows conclusively that there was no failure of the engine or aircraft. It is also certain from the log-book, which has been recovered, that the occupants had kept exactly on their course, and knew their position. The cause of the disaster is believed to have been that, owing to some unexplained circumstances, which may include a failure of the aneroid, the pilot had reason to think that the aircraft was several hundred feet higher than it in fact was. There was a severe local storm in the area where the machine crashed, and it is believed that the pilot only saw the hill at the last moment, and that in the endeavour to clear it, the machine lost flying speed and dived into the ground, just over the brow, an additional factor being possibly the down-draught caused by the prevailing wind.

This official report will be welcomed by all who have the best interests of British aviation at heart, as it decides quite definitely, once and for all, that neither the machine nor the

engine was to blame. It must be realised that when such an accident occurs as that which befell Sqdn.-Ldr. Jones-Williams and Flt.-Lieut. Jenkins, foreign opinion is likely to see in it a proof of inferiority on the part of British aviation material, and it only requires a series of such accidents for such views to become prevalent. In this case, the Air Ministry has made, as it always does, the most searching examination and enquiries, and the conclusion is that neither machine nor engine was at fault.

It now becomes obvious that nothing but the most atrocious ill-luck caused the accident which cost two gallant R.A.F. officers their lives. A few hundred feet of extra height, or a mile or two farther easterly position, and all would have been well. As it was, the machine struck almost the easternmost point of the range of mountains, and crashed. For the sake of British prestige, it is to be hoped that another machine will be built and another attempt made. That the Fairey monoplane and the Napier engine are, between them, capable of beating the existing distance record, we have not the slightest doubt.

AIRISMS FROM THE FOUR WINDS

New Director of Airship Development

THE Air Ministry announces that Wing-Commander Reginald B. B. Colmore, O.B.E., has been appointed Director of Airship Development as from January 1, 1930.

On July 1, 1929, the previous Director, Group Captain P. F. M. Fellowes, D.S.O., was promoted to Air Commodore and transferred from the Royal Airship Works to the Air Ministry as Director of Personal Services, in the department of the Air Member for Personnel. Air Commodore Fellowes had been Director of Airship Development ever since the policy of building R 100 and R 101 had been decided upon. He did splendid work in organising his department. He toured the Empire with the Commission which searched for suitable sites for mooring towers, and we may add with gratitude that the Press owed a great deal to his courtesy on the occasion of Press visits to Pulham and Cardington. He was not originally an airship officer himself, but he threw himself heart and soul into the work, and made a success of it.

Wing-Commander Colmore was obviously the best man to succeed him. From the time when the present programme was commenced he has been Deputy Director. He is himself an airship expert, and his enthusiasm for his subject is infectious. Now that both the new airships have commenced their trials, it was fitting that an actual airship officer should be in charge of the department. Wing-Commander Colmore has also invariably been an excellent host when the Press has descended in swarms upon him, and we have many pleasant recollections of his hospitality. Our gratitude, we may confess, is a lively expectation of favours to come.

The Air Port of Manchester to Open

On January 29 the Lord Mayor of Manchester (F. Norton Barclay) and Alderman Davy (the chairman of the Air Port Committee) will show a party of visitors from some fifty cities round the Air Port of Manchester at Barton—better known as Chat Moss. This aerodrome will be the first in this country which is constructed on the American principle with definite runways for landing and taking off. The visitors will be entertained with a short programme beginning at 11.30 a.m., and there will be a display of wing walking, crazy flying, and banner flying, and also pleasure flights for guests and the public.

Ford Metal Plane in Spain

THE Madrid correspondent of the *Times* reports that the Ford all-metal tri-motor aeroplane, owned by the Spanish Air Monopoly Co., flew to Madrid from Seville on January 10, the prohibition placed upon its use at the instance of the Junkers Co. having been withdrawn.

Indian Flight to India.

ON Monday, January 20, Sir Ahmed Hassanein Bey, the Egyptian explorers and first chamberlain to King Fuad, set out from Heston air park to fly to Egypt in his Gipsy Moth. A tyre burst when he was taking off, and the Moth stood on its nose and broke its propeller. A new one was fitted, and Sir Ahmed then took off and flew to Lympne where he was detained by bad weather.

A Short "Calcutta," for Air Service to India

ON January 17, a Short metal Calcutta (three Jupiters) left Rochester, piloted by Capt. D. Drew, for Alexandria, where it will be put on service by Imperial Airways between that city and Athens. Pending the delivery of this Calcutta, Imperial Airways has been carrying on the service with the help of a Southampton (two Lions) lent by the Air Ministry.

Air Race Round Europe

THE race round Europe, which last year started and finished at Orly, in France, will this year include an English aerodrome in the circuit. Heston air park has been mentioned in this connection. Last August there were two British competitors, Capt. Hubert Broad and Miss W. Spooner. This year a larger British entry may be expected.

Iraq and the Hedjaz

IBN SAUD, the Wahabi king of Nejd, who a few years ago drove King Ali, the eldest brother of King Faisal of Iraq, off the throne of the Hedjaz, seems to lead a life of constant turmoil. All Mussulman countries are, of course, "dry" for religious reasons; but most Mussulmans are keen devotees of tobacco, and the Wahabi prohibition of this and other amenities of life have made the Hedjaz's old soubriquet of Arabia Felix a positive misnomer. Sympathy for the plight of the Hedjazi Arabs, thirsting for the fragrant weed, will be widespread in Europe, and doubtless in Iraq likewise. King Faisal, for one, is not likely to feel any exaggerated affection for the supplanter of his brother.

Recently, two sheikhs of the Hedjaz, named Faisal-ed-Dowish and Ibn Huthlein, rebelled against the Spartan rule of Ibn Saud, but did not prevail against him. Thereupon they crossed the frontier into Iraq and surrendered to a section of R.A.F. armoured cars, claiming *bast* or sanctuary. Protection of a fugitive guest is an unwritten law of the East of immemorial antiquity, of which almost the only recorded breach is the case of Jael, the wife of Heber the Kenite, who killed her fugitive guest, Sisera. Ibn Saud has demanded that his rebels shall be given up to his vengeance. King Faisal and the R.A.F. politely decline to follow the example of Jael. Negotiations continue; but there is no likelihood of the two sheikhs being deprived of their heads and their regained right to smoke.



LLOYD'S REGISTER OF SHIPPING AVIATION COMMITTEE

It was announced in October last that the Committee of Lloyd's Register of Shipping had formed a Department to undertake the Inspection of Civil Aircraft, and that steps were being taken with a view to the formation of a special Aviation Advisory Committee, which would include some of the principal representatives of the various aviation interests in this country.

This Committee has now been formed, and is constituted as follows:—

Sir S. George Higgins, C.B.E. (Chairman of Lloyd's Register), Mr. Arthur L. Sturge (Deputy-Chairman of Lloyd's Register), Mr. J. Howard Glover (Chairman of the Sub-Committees of Classification of Lloyd's Register), Mr. Percy Hargreaves (Chairman of Lloyd's, and Member of the Committee of Lloyd's Register), Mr. I. C. Geddes (Director of the Managers of the Orient Steam Navigation Co., and Member of the Committee of Lloyd's Register), Capt. A. G. Lamplugh (Underwriter, British Aviation Insurance Group), Lieut.-Col. C. E. C. Rabagliati (Underwriting Member of Lloyd's, and of Messrs. Willis, Faber and Dumas).

From the *Royal Aeronautical Society*.—Lieut.-Col. J. T. C. Moore-Brabazon (Vice-President).

From the *Royal Aero Club*.—The Right Hon. Sir Philip Sassoon, Bart., G.B.E., M.P. (Chairman).

From the *Society of British Aircraft Constructors*.—Mr. F. Handley Page, C.B.E. (Chairman), Mr. R. A. Bruce, Westland Aircraft Works (Deputy-Chairman for Aircraft), Mr. A. F.

Sidgreaves, Managing Director of Rolls-Royce, Ltd. (Deputy-Chairman for Engines), Mr. C. C. Walker, De Havilland Aircraft Co.

From the *Imperial Airways, Ltd.*.—Air Vice-Marshal Sir Vyell Vyvyan, K.C.B., D.S.O. (Director).

From the *National Flying Services, Ltd.*.—A representative still to be elected.

It will be seen that this Committee, comprising as it does representatives of all concerned, will be well qualified to render valuable service in promoting the development on sound lines of civil aviation. Considerable progress has already been made in the matter, and with the formation of this new committee it may be anticipated that the activities of the Society in this branch of work will be gradually extended, and will in time embrace many of the services which Lloyd's Register has so long and so successfully rendered in the sphere of shipping.

The Society's Surveyor for Aircraft is Mr. L. J. Hill, who was previously stationed at Croydon Aerodrome in charge of the Inspection of Civil Aircraft on behalf of the Air Ministry, and his services are at the disposal of owners of aircraft and others, who may desire to avail themselves of his expert knowledge and experience. Several inspections for the renewal of Certificates of Airworthiness under Air Ministry Regulations have already been held, and a large number of surveys on behalf of underwriters and others have been undertaken.

PRIVATE FLYING AND CLUB NEWS

HANWORTH CLUB piled up the total of 2,463 hrs. flying time from the end of August to the end of last year. The membership is now 682 and is still growing rapidly, so that, means for extending the accommodation of the club house are already being investigated. Music is provided every Saturday and Sunday afternoon for those who take tea in the ball room, and the excellent dancing floor is made good use of. Dinner dances are being held every alternate Friday, with a special one on the occasions of certain matches at Twickenham. Flt.-Lt. H. M. Schofield, who is in charge of flying at Hanworth, is finding so much work to do with the organisation of this side of the rapidly extending activities of the club that he has little time to fly himself, but he showed that his enforced inactivity has not diminished his prowess when he gave an aerobatic exhibition on Sunday last. His slow rolls were, without exception, the neatest and most beautifully executed that one has seen.

The occasion was a visit of the Japanese Naval delegates to the Naval Conference to Hanworth, as the guests of Col. The Master of Sempill. Hanworth is becoming a recognised meeting place for many of our distinguished foreign visitors and air attachés, and on Saturday last we saw Sqd.-Ldr. A. Kubita, the Air and Military Attaché to the Czechoslovak Legation, with his little Avia B.H.II (60-h.p. Walter), and also Lieut. de Vaisseau Sala, the French Air Attaché, flying his Caudron C-109 (40-h.p. Salmson).

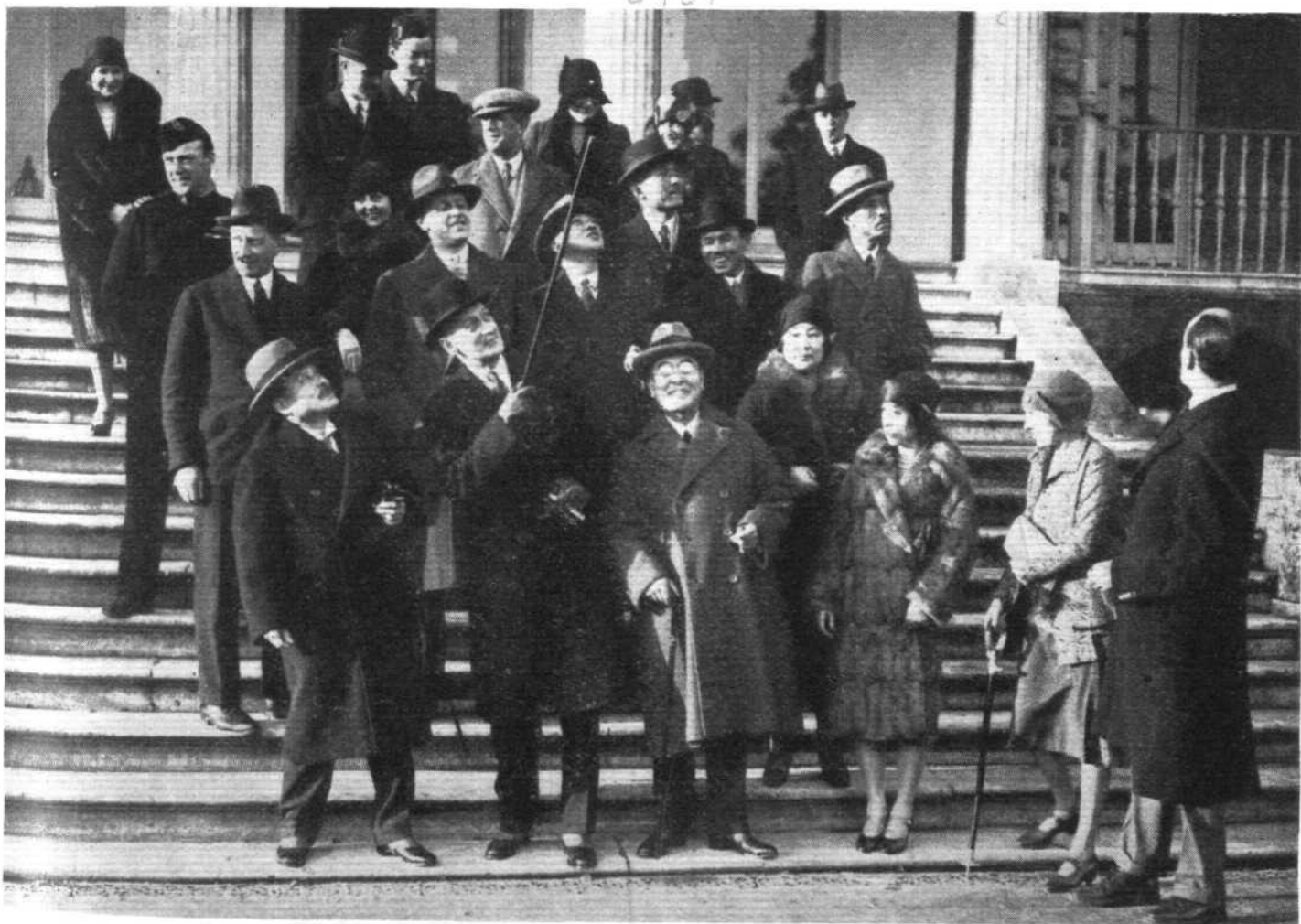
THE YORKSHIRE AEROPLANE CLUB, from October 15 to December 31, that is while they have been under the care of N.F.S., have done 159 hrs.



Sqd.-Ldr. Kubita in his Avia. (FLIGHT Photo.)

THE HULL AERO CLUB, although only opened on October 11, got in 152 hrs. by the end of the year.

THE NOTTINGHAM AERO CLUB, since the date of their inclusion in the N.F.S. organisation on September 5, have flown 147 hrs.



The Japanese Naval Delegation at Hanworth. (Left to right) front row: Admiral Takarabe, Lord Thomson, Admiral Baron Abo, Madame Matsudaira, Madame Takarabe, the Hon. Mrs. Wm. Forbes-Sempill, Col. the Master of Sempill, Second row: Col. Edwardes, Sir Henry Segrave, Commdr. Kanazawa, Capt. Toyoda, Commdr. Yamamoto. Third row: Capt. Stack, Lady Segrave, Sir Sefton Brancker, Capt. Sato. (FLIGHT Photo.)

THE CINQUE PORTS FLYING CLUB have had a few excitements during the past week. On Sunday, 12th, Mr. H. R. Law took off for India in his Widgeon G-EBRN. This machine is fitted with an extra tank in the front cockpit for long-distance flying, and was originally built for Wing-Commr. Manning, who had hoped to fly to Australia on it, but in attempting to do so he crashed on the north coast of Africa.

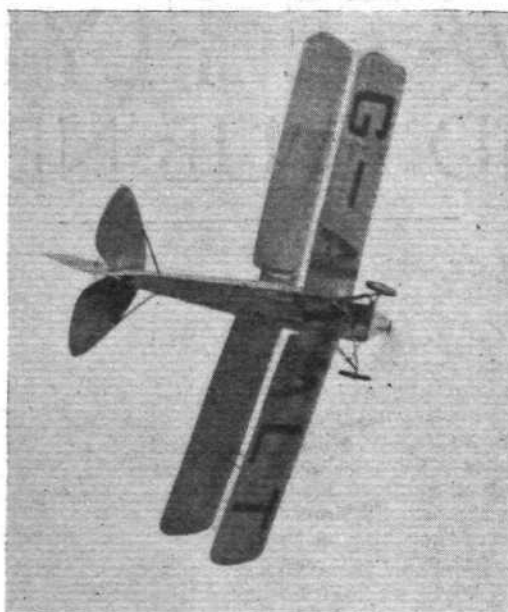
Mr. Law has already made one attempt at this flight, and bad luck seems to follow this machine, because he has now crashed again. The extent of the damage does not seem to be very great, and, as far as one can find out, what happened was that he ran out of oil in Greece (no pun intended), and had to choose between landing in the sea or on a hill, and, on choosing the latter, he himself was cut about the face and the Widgeon somewhat damaged. The hill was apparently in the neighbourhood of Desphina, which is about 70 miles from Athens. Mr. Law is the only surviving son of the late Mr. Bonar Law, and learnt to fly at Lympne at the end of 1928. We hope that he will be able to continue his sporting effort. During the same Sunday afternoon, a gale sprang up, and when four Moths belonging to Heston arrived over the aerodrome from across the Channel, they had to be very nearly pulled out of the sky by all the helpers who could be mustered—landing a Moth in a wind of 52 m.p.h. is not to be recommended without an adequate number of helpers!

THE LONDON AEROPLANE CLUB is raffling an entirely new metal "Gypsy Moth." The draw will take place on March 23 at Stag Lane Aerodrome, Edgware.

The price of the tickets is 10s. each, and the number is limited to 1,500. Tickets may be obtained from the London Aeroplane Club, 3, Clifford Street, London, W.1, or at Stag Lane Aerodrome, Edgware.

THE NORTHAMPTONSHIRE AERO CLUB got two more flying members and 14 associate members during December, which gives them a total of 80 flying members and 266 associate members. With their two machines they managed to get in 33 hrs. 20 mins. flying time during the month. Their annual ball takes place on the 24th, and all the tickets have already been sold, so that the success of the occasion is assured.

NATIONAL FLYING SERVICES are continuing their intensive policy of making the nation air-minded, and for the coming year very considerable developments are to be expected. Six of the Desoutter taxi-machines have already been delivered to Hanworth, and 39 more have been ordered for the coming year. When these arrive they will be apportioned to the various provincial centres. Another



Capt. Broad, entertaining the Japanese delegates at Hanworth with a polished aerobatic display. (FLIGHT Photo.)

addition will be a few larger machines carrying from 4-8 passengers; these may be expected to be in demand when parties wish to go to air meetings and on similar occasions.

The agreements whereby aerodromes will be established at Nottingham and Stoke-on-Trent, and managed by N.F.S. as lessees under the particular Corporation, have been signed, and at Nottingham the aerodrome site at Tollerton has already been purchased and the Nottingham Aero Club has joined, the N.F.S. organisation. The South Staffordshire Aero Club which will be formed at Stoke-on-Trent will be the first in the Pottery district and should, no doubt, thrive, due to this advantage. Another innovation is the office which has been started at Grand Buildings, Trafalgar Square, where anyone will be able to order an air taxi at once, and a car will be available to take customers to Hanworth (40 mins.), from whence they can fly; this will roughly put Southampton within 1½ hrs., Hull 3 hrs., and Glasgow 5½ hrs. The charge being made for the Desoutter two passenger machines

is 1s. 6d. per mile. This office will also be a sort of travel bureau and will provide answers to all queries regarding air transport to any destination.

THIS week we are publishing below a letter from a very enthusiastic private owner who has hit upon several points, the elucidation of which would make flying not only simpler but also more enjoyable for him. He suggests the exchange of views, and we will gladly give space to such matter. There must be many private owners who have their own pet wrinkles for dealing with some difficulty, and if they will let us have a description of them we feel sure that others will find them very helpful.

Capt. N. Stack, who is in charge of all flying of N.F.S., and has, therefore, as much to do with instruction of potential private owners as any one in the country has kindly consented to answer the questions raised, and we shall give his replies next week.

On the question of navigating we hope to have more to say at a later date.

"SIR,—May I, as a keen reader of FLIGHT, almost from No. 1 (alas, my early numbers went west during the war) and a newly-fledged private owner, congratulate you on your coming of age and birthday number.

May I, too, as one of a small but rapidly growing, number of owners who keep their machines at home beyond the daily help of manufacturers, ground engineers or schools, make the suggestion that your "Private Flying" notes might be extended to give information of a more practical nature.

With all possible respect to the flying schools, the private owner has a vast amount to learn when he sets out to run his own machine and landing ground.

The first problem will be, what design of hangar is the most economical and practical, and how can one best arrange refuelling single handed?

My own solution is shown in the enclosed photos.

The hangar gives only about one foot clearance round the machine, the width was decided by the length of some principals which were available, it was necessary therefore to have some means of guiding the machine accurately to avoid damage to the wings.



The little Caudron C.109 (Salmson) which Lt. de Vaisseau Sala uses. (FLIGHT Photo.)

This was done by means of concrete troughs for the wheels, these troughs extending far enough forward to make it impossible to damage the machine whilst manœuvring onto them, and are funnel shaped, for easy approach.

Stops prevent the machine from entering too far.

Petrol is stored in a 300-gallon tank underground, and is raised by a semi-rotary pump to a 5-gallon service tank in the roof, whence it can be gravitated into the machine by a hose.

When full, the 5-gallon tank overflows back into the underground tank.

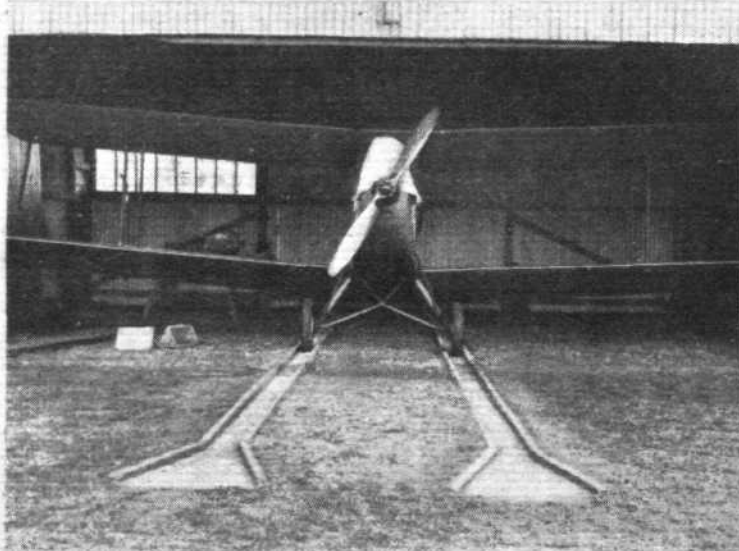
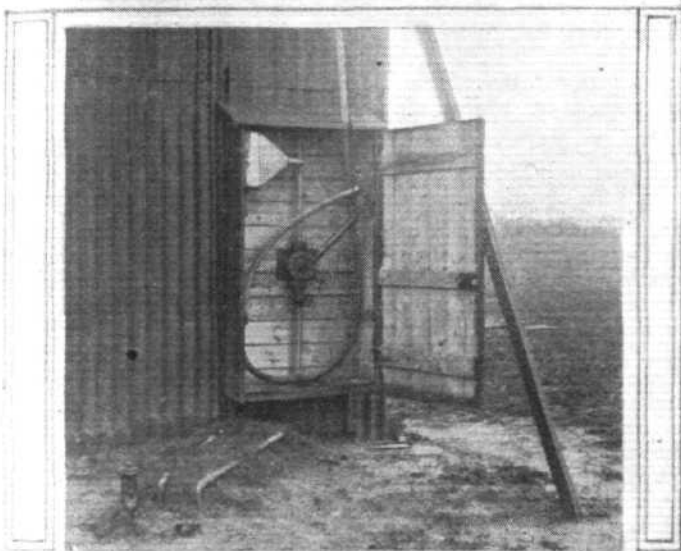
Five gallons cover about one hour's running.

The system employs only the normal vent outside the building; no fumes can escape inside.

What is the best material and size for wind sleeves? Mine have been a constant nuisance during the gales.

Bristol, Nottingham and Norfolk on November 1, 1930; Scottish and Suffolk on December 1, 1930; Cinque Ports on April 1, 1931; Liverpool on September 31, 1931. For all of us therefore the near, if not the immediate, future is fraught with a disturbing uncertainty and it behoves us to gird up our loins and look to our prospects.

A special committee of the General Council has been appointed to prepare and present our case for continued support, but it is likely to be some months yet before we know our fate. Meanwhile it is of interest to note some of the



The top photos show "J. J.'s" hangar, while below on the left is his fuel pump fitted outside the hangar, and on the right the formation of the guiding troughs can be seen

Then there are so many points one has to find out by experience in flying, all part of the game of course, and most intriguing, but liable, if one doesn't happen to guess right first time, to be expensive.

At the moment, I am wondering how one should land up and take off down a hill of about 1 in 7.

No doubt it is quite simple when one knows how, but in cold blood one can see some difficulty, particularly as there is a belt of trees which bottle any re-take-off.

It is a large but steep field in N. Ireland, no others convenient for miles.

I am rather hazy about navigating, and am unable to find a suitable book on the subject.

What is the etiquette of landing on and refuelling at R.A.F. aerodromes?

I know these little problems of mine are as A.B.C. to many of your readers, but there must also be many like myself, who would welcome information and an exchange of views on matters such as these."

"J. J."

Oxford,

January 14, 1930.

MR. ALAN GOODFELLOW, of the Lancashire Aeroplane Club, in the *Elevator* at the end of last year, gave a very clear statement of the flying club position, and in view of foreshadowed developments we feel that we cannot do better than give space to his views on the matter. This week we give the first instalment of his article, and later we shall give the figures for the past year.

Ahead of us lies 1930—and the end of the existing agreements with the Air Council. Only four Clubs, the oldest four, are immediately concerned, for the Hampshire Club's agreement is a year later in date, while the Yorkshire Club has passed into the hands of N.F.S. Ltd. There are thirteen State-assisted Clubs, all told, and their agreements expire in the following order:—Lancashire, London, Midland, Newcastle and Yorkshire on July 31, 1930;

actual results achieved by the Clubs, which should speak louder than any amount of glowing estimates.

At the end of 1925 the Clubs total 780 members of all classes. In 1926 this had increased to 1,005; in 1927 to 2,187; in 1928 to 3,288. By October, 1929, the total had passed the 5,000 line. Lancashire ranked sixth at the end of 1928 with a membership of 293.

The total number of pilots trained by the Clubs rose from 12 in 1925 to 475 at the end of 1928. Under this heading the Lancashire Club ranked fourth with 47, but we have probably improved our position since, as last year was a good one in this respect.

The annual flying hours achieved by the Clubs were as follows:—1925 (five Clubs) 727 hours. 1926 (six Clubs) 4,358 hours. 1927 (six Clubs) 6,158 hours. 1928 (thirteen Clubs) 12,201 hours. For the year 1928 Lancashire ranked no better than sixth with 1,001 hours, but on the number of flights we ranked third with 3,600 flights. The figures for 1929 are not yet, of course, available, but there is little doubt that they will show at least a proportionate improvement.

When we come to consider the indirect results of the Light Aeroplane Club movement they are even more striking. The movement has spread from England to the Dominions and whereas at the end of 1925 there were only five Clubs, all in England, by the end of 1928 there were no less than 26 Clubs in England, 10 in Australia, 16 in Canada, 4 in India, 9 in New Zealand, 8 in South Africa, and one each in East Africa, Singapore, and the Irish Free State. The grand total is 76, and even this does not include the many additions of 1929.

Private ownership of aeroplanes was almost unknown before the Clubs began. In August, 1926, there were only 24 private owners in England. Just over two years later there were 138. Again the current year will show an even more marked improvement at home, apart from the scores of privately-owned machines now being operated in the Dominions.

In the year 1928 the subsidised Flying Clubs of England, Australia, Canada and South Africa carried out over 30,000 hours' flying (200,000 air miles) and counted nearly 800 trained pilots in their membership.

These figures speak for themselves and give unanswerable proof of the value of the Clubs. Yet in truth their greatest value lies not in these figures, striking as they are, but in the way in which they have developed air-mindedness throughout the length and breadth of our possessions. Civil aviation can never make progress in any country until the populace has accepted it and acquired faith in it. The widespread membership of the Clubs, attracting people from all ranks of society, the scores of public pageants and race meetings organised by them, and, finally, the remarkable safety with which they have carried out their operations—all these have combined to produce an effect of inestimable but tremendous value to the progress of civil aviation.

So much for the results—what of the cost to the State?

Out of a total vote for 1929 of £450,000, the tremendous sum of £16,000 was set aside for the Light Aeroplane Clubs, as compared with £349,000 for Imperial Airways! We have not the exact figures but it is doubtful if the Clubs, over their first four years of operation, have cost the State a total of £50,000—certainly not much more. £50,000 in four years, while Imperial Airways costs us seven times, and the auxiliary and special reserve squadrons of the Air Force cost us ten times, that amount *each year*!

It would be folly to decry the value either of Imperial Airways or of the A.A.F. and S.R. But one is justified, looking to the future, in pointing out that no other branch of flying can show anything approaching the value of the Light Aeroplane movement to the State in comparison with the public money expended on it.

Towards the end of its administration, the late Government, in answer to a deputation from the Association of Light Aeroplane Clubs, indicated that no further support could be looked for and, almost in the same breath, granted a subsidy to a commercial concern formed, *inter alia*, for the running of commercial light aeroplane Clubs on an extensive scale. At the time this seemed somewhat of a stab in the back, bearing in mind the brilliant and ever-extending work which was being carried out by the established Clubs. There were two rays of hope in the outlook, however, for in the first place it was definitely agreed that National Flying Services would not enter into competition with the existing Clubs, and in the second place the door was not absolutely closed to such of the voluntary Clubs as might, at a later date, be able to make out a good case for continued assistance.

In this issue we have dealt with the work of the Clubs as a whole and their case for support; in our next issue we propose to deal with their future prospects and with their position relative to other subsidised and non-subsidised organisations.

(To be continued.)

THE BRITISH GLIDING ASSOCIATION, whose President is Air Vice-Marshal Sir Sefton Brancker, K.C.B., A.F.C., has received a very generous donation of £1,000 from Lord Wakefield.

The Association hopes that this magnificent example will be followed by all who have the future of British aviation at heart to enable the Gliding Movement to resume the place it won at Itford in 1922, when, it will be remembered, the British pilots put up a fine performance. Since that date the interest in gliding has been largely confined to Germany and the U.S.A. Now, however, the British Gliding Association is re-introducing the sport in a form which will be available for those of slender means who wish to enjoy the sport of flying without the expense of a power-driven aeroplane.

Donations to the fund, headed by Lord Wakefield, and subscriptions to the Association, may be sent to the Hon. Secretary, L. Howard-Flanders, A.F.R.Ae.S., M.I.Ae.E., A.M.I.Mech.E., c/o The Royal Aeronautical Society, 7, Albemarle Street, W. 1.

A HONG KONG FLYING CLUB has now been formed with its headquarters at the Kai Tak Aerodrome at the head of Kowloon Bay. This aerodrome is a government aerodrome and the Hong Kong Government has voted the club \$60,000 as an initial grant with an annual subsidy of \$30,000. His Excellency the Governor, Sir Cecil Clementi, presided at the inaugural meeting on December 20th and stressed the need of aviation in that part of China as there is a great lack of roads and railways. We hope that the club will prove to be a real live one and from the enthusiasm which has already been shown we do not think there is much doubt about its ultimate success.



Ft.-Lt. Rawson demonstrating the Auto-Gyro at Hanworth before the Japanese visitors.
(FLIGHT Photo.)

THE BERKS, BUCKS AND OXON AERO CLUB held one of the most enjoyable dinners and dance on Tuesday, 21st, that it has been our luck to attend. It is proverbial that journalists should be somewhat blasé about such forms of entertainment having, as they do, to attend so many as part of their job, but even the most hardened critic would have been hard put to it to have found

much to cavil at on Tuesday evening.

Sir Sefton Brancker was the guest of the evening and he surpassed himself when replying to the toast of his health. In a very witty speech he paid tribute to the good work which has been done by the club and which was started by the original members before the club was amalgamated with National Flying Services. He made an especial plea for the lady members to get their "tickets" and pointed out that they had an altogether exceptional example in keenness in their own secretary, Miss Tony Cribb, who although she had not yet got her licence was one of the ablest and most enthusiastic secretaries one could possibly wish for.

Capt. Montagu-Puckle deputised for the chairman of the club, Mr. Arthur Russell, who was indisposed, and in doing so he gave a very lucid account of the club's progress from the day it was formed, without an aerodrome or machine, in 1928 up to the present day. Mention was made of the very great help that Capt. Schofield had given in the selection of an aerodrome by flying over and inspecting sites for them when he was stationed at Heyford. In Capt. Pennington, he said, they had just about the best instructor they could have, and he dilated at length on the results which Capt. Pennington had been able to achieve since he came to them.

Capt. Pennington in replying disclaimed any of the credit for the progress of the club and said that it was entirely due to the magnificent organisation which they had behind them in the persons of N.F.S. In the old days when a machine was crashed it meant the cessation of flying until the overworked ground engineer had been able to repair it, but now with N.F.S. behind them, he had only to ask for a machine and they got it "by return," and when he had said that the work was growing too much for him they had promptly sent down another instructor.

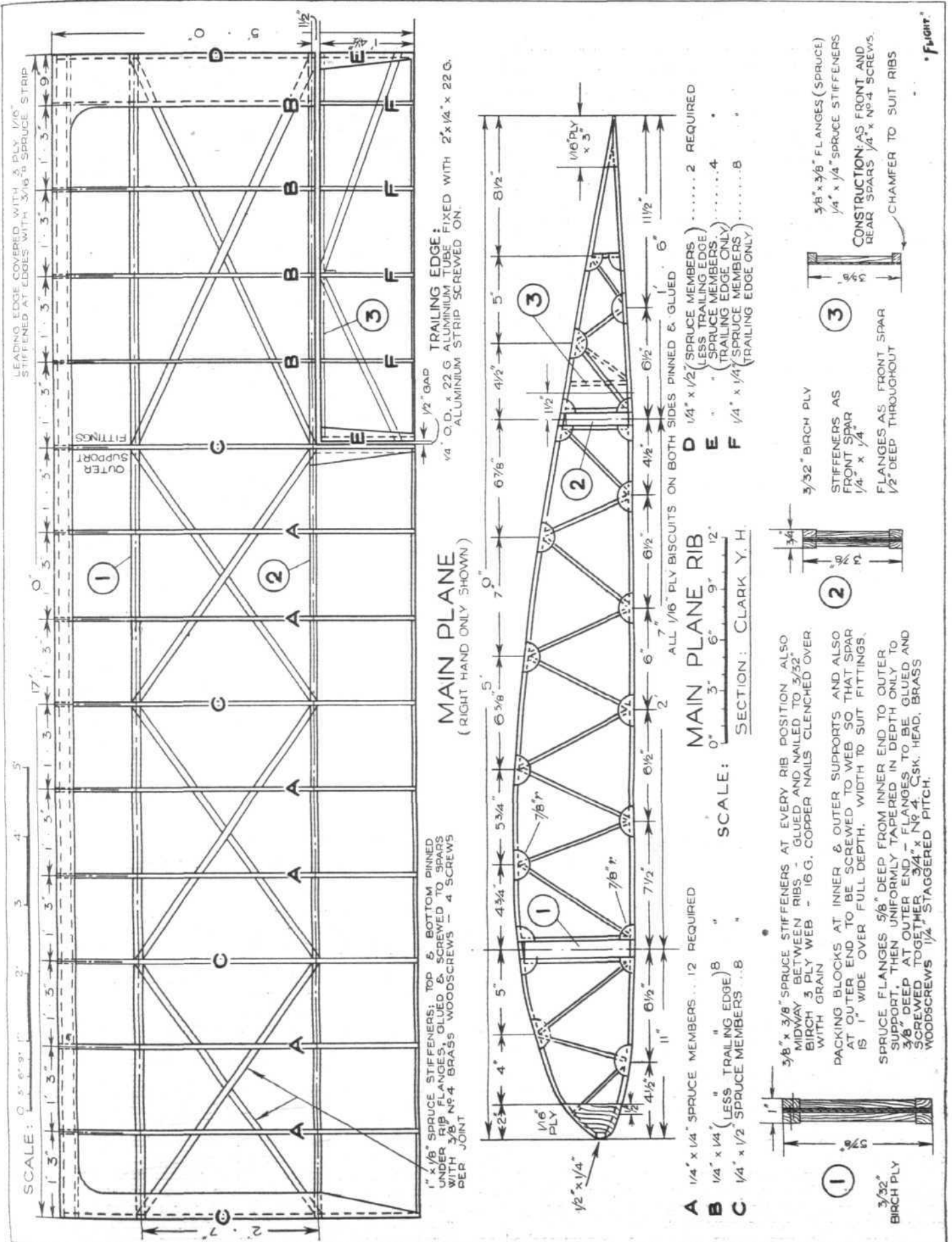
Mr. G. Boyes proposed the health of Sir Sefton Brancker and said that he was the best friend that civil aviation ever had, and he felt sure that he was voicing the feelings of all when he said that the work Sir Sefton had done was fully appreciated by them, and it was therefore up to them to see that it was also appreciated by the public.

Capt. Stack felt that he was honoured, as he had the pleasantest duty of all, and that was to propose the health of their secretary Miss Cribb. She had been the secretary from the very earliest days and thoroughly deserved all the bouquets that could be handed out to her for the unselfish and hard work that she had put in.

Miss Cribb replied, and in thanking everyone for the very nice things they had said about her, said that their recent success as a club was due to the backing they had had from N.F.S., and she asked them to drink to the success of N.F.S., the club and aviation.

THIS week we publish the drawings of the wing construction of the "Dickson" glider. The general scheme has been to use just a few standard sections of spruce, and thereby make the glider simple and inexpensive. This method does not, of course, allow the use of the most economical design, but the advantages gained for the purpose for

which the glider is intended, far outweigh the disadvantages. Further constructional details will be published as soon as they are received. We have already had a considerable amount of correspondence on this glider, and if there are any points which readers are not clear about we shall endeavour to elucidate them.





AIR TRANSPORT

GIANT SIKORSKY AMPHIBIAN FOR PAN-AMERICAN AIRWAYS

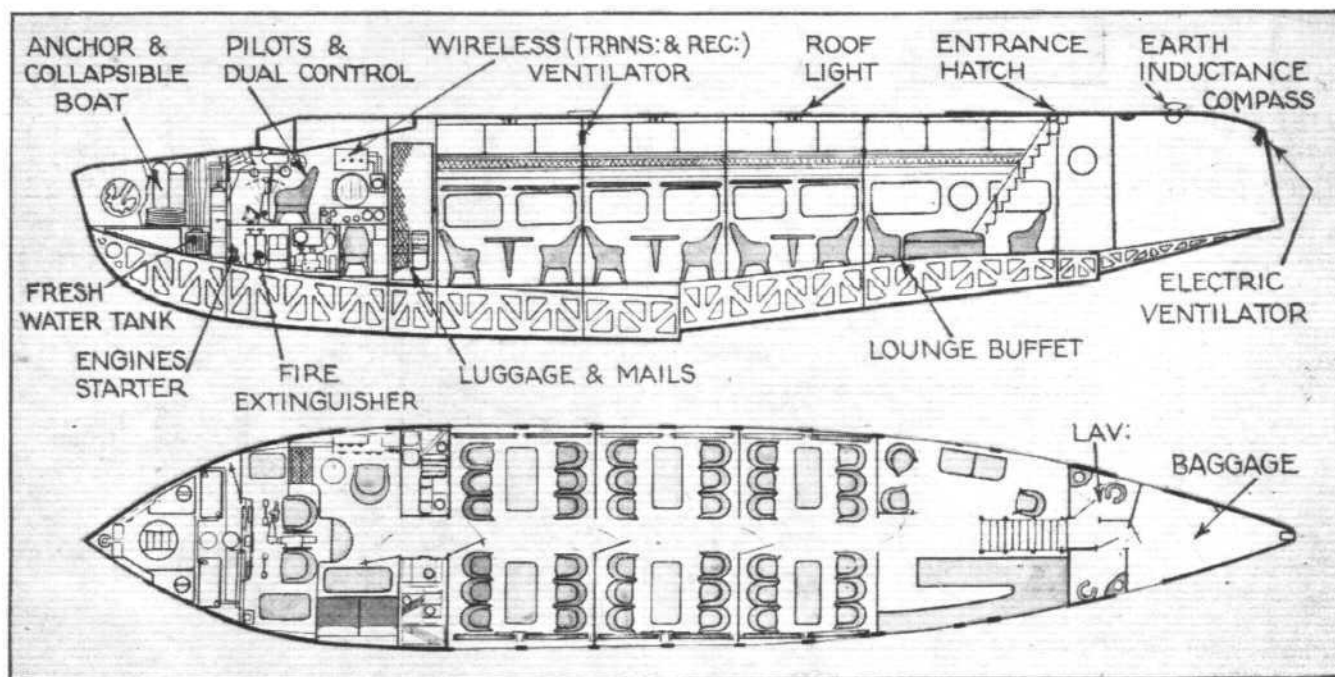
THE Sikorsky Aviation Corporation of Bridgeport, Conn., have just announced the sale of two 41-passenger Sikorsky Amphibians, costing \$125,000 each, to Pan-American Airways. For some months past the Sikorsky company has been working on the design of this amphibian, which is known as the "S-40," and on the approval of Col. Lindbergh Pan-American Airways signed for the first two to be constructed—and these, it is hoped, will be put into service in December next in the inauguration of a 24-hour service between New York City and Cristobal, Canal Zone. Passengers and mails will be carried by night from New York to Miami in small machines, thence the 1,200-mile jump across the Caribbean Sea to Cristobal will be made by the S-40's.

The S-40 amphibian is the result of a very extensive experi-

Pilot's cockpit can be used either open or closed. Power plant units complete with oil tanks will be easily and quickly interchangeable. Engines will be provided with starters and adjustable metal blade propellers. Storage space and hoisting arrangement will be provided for carrying a spare engine. Fuel tanks will be located in the wing with gravity feed and capacity for four hours' flight. Balance of the fuel will be carried in the tanks located on the top of the floats. Cross feed valves permit any engine to be supplied from any tank. A walk-way will be provided along the lower structure to the side pontoons.

The location of the motors with relation to the cabin will eliminate disagreeable noise. A special compartment will be provided for luggage and mail up to 250 cubic ft.

It is claimed that the machine will fly and climb with any



THE SIKORSKY "S-40" AMPHIBIAN: Side and plan drawing of the hull of the 41-passenger flying boat, which will be fitted with four Pratt and Whitney "Hornet B" (575-h.p.) engines

ence with 4-engined 'planes abroad and of two years' operating experience of the Sikorsky S-38 and other models on Pan-American Airways, etc. The present design has been arrived at only after a complete research in the wind tunnel and water basin extending over a period of twelve months.

We are only able to give some brief particulars of the S-40 at present. In general appearance the S-40 is not unlike the S-38, which has previously been described in *FLIGHT*. That is, it has a central boat-like hull, above which are mounted the monoplane wings, the four engines (575 h.p. Pratt and Whitney "Hornet B"), and the tail planes, carried by outriggers from the main wings. Very short lower wings also extend from the sides of the hull and on the tips of these are mounted lateral floats.

The large size of the hull not only permits unusual room for passenger accommodation—the roomy cabin combined with large windows and unobstructed vision, height of cabin, and perfect ventilation giving, it is claimed, exceptional comfort—but, with its properly designed lines, exceptional seaworthiness qualities are promised.

The special features of the S-40 may be summarised as follows:—

one engine stopped, carrying full load. The boat hull has ample flotation with not less than five water-tight compartments, any two of which will keep the ship afloat. In case of damage to the side floats, the petrol tanks will be capable of keeping the ship in balance while afloat.

No passengers or crew are located in the plane of rotation of the propellers, while the location of the engines, no engines or propellers being in front, provides good visibility for the pilot.

The following are a few constructional details:—

Wings.—All metal dural construction covered with fabric. Spars are open section, Warren trusses riveted and bolted on gusset plates. Ribs are of dural. Leading edge will be partly covered with dural sheet to retain correct shape of the airfoil and also give extra rigidity. Ailerons are of balanced type and so constructed that all vibration at any speed is entirely eliminated. Hinges are readily accessible for check and greasing. Ample openings for inspection will be provided throughout on the wing. Interior bracing is high grade round and square steel tie-rods. Before covering, the structure will be painted with proper protective paint.

Struts.—Dural streamline tubes and structural dural

boxes will be used. Lower structure will be readily accessible for painting and greasing to prevent corrosion.

Hull.—The structure consists of dural open sections riveted to the skin, which is of Alclad sheet. "Auld-metal" floor will give neat appearance and long life. Bottom structure is so designed that no water can stay in hidden places. Ample ventilation and accessibility will be provided to permit inspection and repair of all parts of the boat hull and especially the bottom structure. A strong keel will be provided to withstand the most severe condition if the bottom touches ground.

Main entrance is so located, at the rear of the hull, as to permit passengers to board the ship with comfort and complete safety while the engines are running, either on land or water. There will be three emergency exits in addition to the main entrance.

Tanks.—Petrol and oil tanks are of riveted dural sheets, and constructed according to the new and considerably improved Sikorsky method. Pressure tests will be made according to the requirements of the Department of Commerce.

Surface controls.—These will be of the same type as on the S-38-B Amphibian, with the addition of a dual control combination. Ball bearings are provided on all controls to reduce the effort necessary.

Equipment.—The aeroplane will be equipped with propellers and starters, standard flight and navigation and motor instruments, marine equipment, comfortable chairs, sleeping quarters for the crew, kitchen and buffet arrangements, separate toilet facilities for ladies and gentlemen, fire apparatus, life preservers, and complete equipment as required by the Department of Commerce.

Dimensions.—Span, 114 ft.; chord, 16 ft.; height (on wheels), 22 ft. 11 ins.; length, 72 ft. 11 ins.; wing area, 1,980 sq. ft.; power, 4 Pratt & Whitney "Hornet B," total 2,300 h.p.

Performance.—Useful load, 11,250 lbs.; high speed (sea level), 129 m.p.h.; cruising speed (1,700 rev.), 108 m.p.h.; climb (first minute with full load), 675 ft. per minute; ceiling, 13,000 ft.; stalling speed, 65 m.p.h.; cruising speed on 3 engines, 90 to 100 m.p.h.; weight of amphibian gear, 1,250 lbs.

FRENCH AND BELGIAN AIR ACTIVITIES

CONSIDERABLE activity as regards French air transport may be expected during 1930, especially following the decision of the French Government to carry out their scheme of merging the principal commercial air lines into three "systems"—about which we shall have something to say next week. For instance, a large amount of preparation is in hand for the establishment of a network of air lines from France to the Far East. Some of these routes are the outcome of conferences between M. Laurent Eynac and Lord Thomson, and will be carried out by the "Cie Air Asie" (originally the "Société d'Etudes et d'Entreprises d'Aviation en Indo-Chine et en Extrême-Orient"), which will act as a branch of the "Eastern" company (Air Union and Air Union Lignes d'Orient) formed by the above-mentioned scheme.

Air lines are being planned with points of call at Calcutta, Akyab, and Rangoon, thence to Canton via Pitsnanoulok, Hong-Khay, Paksane (Siam), Vinh, Haiphong,

and Shanghai. Connections will also be made with French Indo-China to Saigon via Bangkok, Angkor, Pnom-Penh, etc., and in this special agreements have been made with the Dutch Government in respect to the K.L.M. air mail services operating between Holland and Dutch East Indies. In Africa, also, new developments may be looked for. Not only are negotiations proceeding between the Belgian and French Air Ministries for a joint air service between Brussels and the Congo, via Paris, Marseilles, Algiers and the Sahara, but the recent "missions"—both by land and air—surveying African air routes across the Sahara and to Lake Chad and Madagascar have, apparently, demonstrated great possibilities as regards air services from France to these parts of Africa. There is, in fact, a mission now at work, headed by Count de Neufbourg, in establishing an air route for Cie Transafricaine d'Aviation between Algiers, Langhouat, El-Golea, Aoulef, El-Ouit, Bouren, Gao, Zinder, Fort Lamy, Bangin, and Brazzaville.

SOME K.L.M. STATISTICS

THE following figures concerning hours flown, etc., by the Royal Dutch air service (K.L.M.) may be of interest. K.L.M. has three types of aeroplanes in regular use on the European and Indian airlines. These machines are all of the well-known Fokker type, with welded steel fuselage and wooden cantilever wing.

The F VIIA type is fitted with one Gnome et Rhône Jupiter engine, built in France. The F VIII machines have two of these engines and the F VIIB3n. have three Titan engines of 240 h.p. each.

With F VIIA aeroplanes 5,246 hrs. have been flown in 1929, against 5,594 hrs. in 1928. The F VIII machines have flown 3,516 hrs. in 1929, against 3,569 hrs. in 1928. The three engine planes have done 3,161 hrs. in 1929, against 538 in 1928.

Total hours flown, with K.L.M. machines, in 1929 amounts to 12,414, against 10,287 hrs. in 1928. Total hours flown during the 10 years the K.L.M. has been flying, amounts to 61,051, covering a distance of over 9,000,000 km.

In 1929 Jupiter engines, Series IV, have run 4,162 hrs., against 5,486 hrs. in 1928. The Series VI Jupiter engines have made 9,568 hrs. in 1929, against 8,605 in 1928. Total hours run with Jupiter engines in 1929 amounts to 13,730, against 14,102 in 1928. With Titan engines K.L.M. has flown in 1928 1,751 hrs., which number has been increased in 1929 up to 10,050 hrs.

The total of all hours of all engines K.L.M. has used during her 10 years' regular air service exploitation is 82,538. During 1929 K.L.M. has accomplished with four 3-engined monoplanes 1,389 hrs. on the regular fortnightly service between Batavia and Amsterdam. In 1929 about 13,000 km. between Amsterdam and Batavia has been flown 13 times with only one forced landing, by which the machine was only slightly damaged on the last stretch of the trip. The mail was restarted in five days. In all other 13 flights, the mail has been delivered within 14 days. Several trips have been made in 11 days, without any incident.

National Air Transport Flies 2,646,966 miles in 1929

PLANES and pilots of National Air Transport flew a total of 2,646,966 miles in 1929, of which 1,270,668 miles, or approximately half the total, were flown at night. This is an increase of 400,000 miles over the 1928 mileage. N.A.T. is carrier of air mail and air express between New York, Cleveland, Toledo, Chicago, Kansas City and Oklahoma and Texas cities. While N.A.T. planes were piling up this mileage during the last year, they were carrying a cargo of 2,027,959 lbs. of mails and 75,607 lbs. of express, a total of 2,103,566 lbs. This is approximately 900,000 lbs. more cargo than was carried by the company in 1928. Increased regularity of service over the N.A.T. lines during the year was due in no small measure to the application

of radio as a means of overcoming bad weather conditions. All N.A.T. planes during the year were equipped with radio receiving sets. These sets, on which much work has been done by N.A.T. engineers co-operating with experts of the airways division of the U.S. Department of Commerce, are capable of receiving weather reports for the pilot while in flight, as well as keeping him on his course through the dots and dashes of the radio range beacons along the airways. In many instances N.A.T. pilots were enabled to complete trips over the mountains between Cleveland and New York with the aid of radio that would otherwise have been forfeited because of impossible weather conditions. Finally, in the four years of N.A.T. operations, N.A.T. planes have flown 6,536,813 miles, and have carried 3,507,463 lbs. of mail and 160,854 lbs. of express.

CORRESPONDENCE

[The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.]

ACCELERATION

[2268] In reply to Mr. W. E. Gray, I should like to refer him to a text-book, but I will endeavour to explain myself. A weight is considered as a force in pounds in elementary statics and dynamics. In a little more advanced stage it is often considered as a mass acceleration, denoted by mg. Perhaps now Mr. Gray, though he insists St. Paul's has no velocity (he means relative to the earth) he may see that a mass acceleration exists.

Again Mr. Gray insists that a body may not have two accelerations, but I maintain that a mass has an acceleration along the axis of each force acting on that mass, each being separately considered as a datum, the nett or resultant acceleration being found vectorially. Has Mr. Gray considered a weight rotating at the end of a string? It may have a tangential acceleration, as well as its acceleration towards the centre and the acceleration due to gravity.

It is true that the aerodynamic forces of an aeroplane produce accelerations in the axes of flight and the mass acceleration acts vertically. In my article I said "the nett acceleration is the difference between the load factor (in units of g) and gravity" and in its text when referring to the lift moving vertically only was correct; this statement was not made referring to aeroplanes at all.

Mr. Gray will wander from the point, but I will inform him that in most British and all American Reports the load factor is given as a function of gravity which is an acceleration. Also that while a force equals the product of the mass and the acceleration, an acceleration is also the ratio of a force to a mass.

A. E. RUSSELL.

Bristol, January 13, 1930.

GLIDING

[2269] As your leaders are widely read I feel that the effect of your remarks on gliding in your issue for January 17 will probably, in spite of your protestations, have the effect of throwing an amount of cold water upon the efforts of those enthusiasts who are endeavouring to revive interest in gliding.

Although interest did definitely cease after the splendid flight of Maneyrol in 1922, yet at the same time there have always been many who, with a little encouragement, would take it up again; surely this is borne out by the experience of the German Clubs where, after a little instruction and suitable organisation, gliding has become a national institution.

You differ with the view which many hold that there is definite aerodynamic knowledge to be gained from gliding. Although you are probably right when you aver that aerodynamic knowledge is not to be obtained from gliding, that is assuming you mean aerodynamic knowledge as applied to the aircraft, there must, however, be a lot to be learnt about the behaviour of air currents which can very well be learnt by means of gliders, indeed better by this means than by power-driven aircraft, and surely this view is borne out by the action of the R.Ae.S. and the words of Col. Sempill at the inaugural gliding lunch quoted in your own columns of the issue for December 13.

You are undoubtedly right when you say that the chief appeal will be as a sport, but the mere fact that there is something to be learnt from this sport will give it an added advantage as a sport. There is also another point which seems to have escaped you and that is that, although there may be disadvantages in youngsters getting their first aerial baptism in gliders, yet at the same time experience of this kind must give them confidence in the air, which attribute cannot fail to be of use when they graduate to power-driven machines.

Finally, may I suggest that by casting wet blankets on the efforts of those who are endeavouring to spread the gospel of air-mindedness, without adequate reason, you are lowering the esteem with which your leaders are read by all those who have learnt to expect so much from FLIGHT.

J. C.
London, January 18, 1930.

[The last thing in the world which we intended was to "throw cold water" on the work of reviving the sport of gliding. FLIGHT has not been accused of inconsistency in the past, and no journal, we venture to assert, did more to

encourage gliding a few years ago. But it is precisely because of previous experience that we wished to utter a word of advice. There was a time when it was thought that gliding would teach us all manner of things. All it did teach us was that, given a suitable hill and a strong enough wind, there is no difficulty in "sitting on a jet of air" for as long as the pilot's physical endurance will permit.

Then, it was thought, and apparently our correspondent still believes this to be true, that gliding would teach a great deal about aerodynamic design. Actually it teaches very little that can be applied to power-driven aircraft. The types of German light 'planes that were produced as the logical development of the glider, i.e., the ultra low-powered machines, are giving way to machines of higher power and of more orthodox design, i.e., becoming more like the British light 'plane of modern times. "J. C." thinks that by gliding a lot can be learnt about the behaviour of air currents. Agreed. But when he has learnt all about the air currents what is he going to do with them? They are not of any material help to power-driven aircraft.

We are informed on good authority that German experience has been that pilots trained initially on gliders did not, generally speaking, prove particularly brilliant when they had to learn to fly power-driven aircraft. The similarity between the two types is not great. Almost the only time when there is much similarity is in the case of the power-driven machine coming in to land, i.e., when it has become a "glider." The glider is slow and sluggish (compared with most aeroplanes), and requires very different handling.

Gliding as a sport is, as we said, extremely good fun. Our object was to prevent disappointment later by pointing out to those who are now enthusiastic that nothing more should be expected from it. As a sort of research laboratory we do not personally expect anything much from it. As a training school for pilots we expect very little more. As a sport it may one day rival tobogganing, provided those concerned have enough enthusiasm to wait, occasionally, for days on end when the weather is unsuitable, to work hard on repairs after crashes, to manhandle the glider back to the top of the hill after each flight, to walk miles backward and forward to reach it and bring it back, and to haul on the "bunjie" with a will at each start, and a dozen other things which are not gliding. No more healthy outdoor life could be imagined, and we wish the movement every possible success and will give it all the support we can by recording and illustrating activities, reporting papers, lectures, &c., and in any other way possible. But we doubt whether gliding will ever attain the popularity here that it has in Germany. Due chiefly to the fundamental difference in temperament between the average German and the average English youth.

—ED.]

MODELS

[2270] A regular "Models" Section in FLIGHT once more! This would indeed be a treat to all like myself, who are keen aero-modellists, whether attached to a model society or lone workers. I speak as one of the latter, although I hope it will not be long before (with the co-operation of your valuable publication) there will be formed a club near enough to become attached to.

Mr. Rippon's letter brings back to me many happy memories of past issues of FLIGHT, when as a very youthful model maker I eagerly devoured the Models Section (conducted by Mr. V. E. Johnson), and read of the doings of the lucky members of clubs, including, of course, the famous "Blackheath." In conclusion, Sir, please add my name to the list of those who would be more than delighted with the re-introduction of a regular "Models" Section.

(ANOTHER LONE FLIER)

VERE WILKINS

Trowbridge, Wilts.

January 18, 1930.

[We have received a number of other letters on this subject, but lack of space prevents their publication. However, model enthusiasts—and, we hope, other readers of FLIGHT—will be glad to hear that we are reviving the Model Section as a regular feature, and hope to start this within the next few weeks. Will Model Clubs and others associated with models please note, and forward any reports or items of interest?—ED.]

THE ROYAL AIR FORCE

London Gazette, January 17, 1930

General Duties Branch

The following flight cadets having successfully passed through the R.A.F. College, Cranwell, are granted permanent commissions as Pilot Officers with effect from, and with seniority of December 14, 1929:—A. Earle, G. R. A. Elsmie, F. F. Wicks, J. H. Percy, R. L. Wallace, E. S. Dru Drury, W. Sawyer, B. A. Fraser, W. H. Kyle, W. N. McKechnie, P. Heath, A. G. Teideman, G. F. W. Heycock, L. W. C. Bower, R. V. McIntyre, B. H. Jones, J. Grierson, J. Y. Humphreys, E. F. J. L'Estrange.

The following are granted short-service commissions as Pilot Officers on probation with effect from, and with seniority of December 27, 1929:—C. E. Alven, D. J. Alvey, W. B. Bailey, J. Bamber, E. V. N. Bramley (Sec. Lt. Supplementary Res. of Officers, The East Surrey Regt.), R. A. Byrne, M. G. C. Chadwick, H. F. Chester, H. M. Chubb, A. R. T. Coke, C. W. W. S. Conway, L. E. Dalrymple, E. Elgey, C. J. Farrell, E. M. Gurney, G. J. Holland, D. Holt, L. W. V. Jemmen, A. W. R. Lawson, R. P. J. Leborgne, N. S. Lesmere, D. W. Lucke, R. A. McMurtrie (Sec. Lt. 72nd Northumbrian Fd. Bde. R.A. (T.A.)), R. J. R. H. Makgill (Sec. Lt. 18th Lond. Regt.), W. R. Ottewill, W. C. Pitts, W. T. Ratcliffe, B. P. Reynolds, H. W. Riley, A. C. Sant, L. E. B. Stonhill, M. F. Summers, W. B. Thompson, G. R. White, R. B. Whittingham, A. R. Wilson, F. Woodward.

Major V. M. Kenny-Leveck, M.B.E. (R.A.R.O.), is granted a short-service commission as Flt.-Lieut. (Hon. Sqdn. Ldr.) for three years on the active list, with effect from Sept. 30, 1929, and with seniority of Sept. 30, 1924. (Substituted for Gazette Oct. 15, 1929.) Pilot Officer on probation P. B. Rogers is confirmed in rank (Jan. 3). The following Pilot Officers are promoted to rank of Flying Officer:—A. N. E. Hall (Sept. 16, 1929); A. C. Mitchell, E. C. Passmore, J. C. Harcombe, J. R. Robins, P. J. J. Cullinan, G. A. E. Harkness, R. Louis (Nov. 25, 1929); R. C. Jordan, R. V. Griffin, G. K. Tulloch, G. E. Sampson, R. R. Frith (Dec. 11, 1929); W. G. Stevenson (Dec. 29, 1929); N. W. A. Cullum (with seniority of Dec. 29, 1929) (Jan. 6).

Group Captain M. Grahame Christie, C.M.G., D.S.O., M.C., is placed on retired list at his own request (Jan. 15); Pilot Officer on probation T. E. Dunville resigns his short-service commission (Jan. 15). The following Lts., R.N., Flying Officers, R.A.F., cease to be attached to the R.A.F., on return to Naval duty:—E. W. E. Lane (Jan. 1); P. W. W. Wootten (Jan. 3); Lt. C. J. N. Atkinson, R.N., Flight Lt., R.A.F., ceases to be attached to R.A.F., on return to Naval duty (Jan. 4, 1929). (Substituted for Gazette, Jan. 18, 1929.)

Pilot Officer I. M. Smith is dismissed the Service by sentence of General Court Martial (Jan. 4).

Stores Branch

Flight-Lt. F. J. Cooke is placed on retired list on account of ill-health (Jan. 11).

Chaplain's Branch

The Rev. F. D. Morley, B.D., is granted a short-service commission as Chaplain (Wesleyan) with the relative rank of Squadron-Leader (Jan. 7).

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

Flying Officer W. N. Lancaster is transferred from Class A to Class C (July 1, 1929). The following Flying Officers are transferred from Class C to Class A:—G. W. Smart (Oct. 30, 1929); R. P. D. Braili (Dec. 4, 1929). Flying Officer E. L. Burslem resigns his commission (Dec. 23, 1929).

Stores Branch

Flying Officer W. A. Kyte is transferred from Class B to Class C (Sept. 12, 1929).

AUXILIARY AIR FORCE

General Duties Branch

No. 600 CITY OF LONDON (BOMBER) SQUADRON.—The following to be Pilot Officer:—I. R. Campbell-Orde (Dec. 10, 1929). No. 602 CITY OF GLASGOW (BOMBER) SQUADRON.—The following to be Pilot Officer:—B. C. H. Ogilvie (Dec. 11, 1929).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Wing Commanders: A. A. Walser, M.C., D.F.C., to H.Q., R.A.F., Halton, for Air Staff duties, 21.12.29. H. J. F. Hunter, M.C., to No. 1 Sch. of Tech. Training (Apprentices), Halton, for Administrative duties with No. 1 App. Wing, 14.12.29. C. J. Mackay, M.C., D.F.C., to R.A.F. Staff College, Andover, for duty as an Instructor, 1.1.30. C. E. Maude, to No. 21 Group H.Q., West Drayton, for Engineer Staff duties, 3.1.30. C. W. H. Pulford, O.B.E., A.F.C., to No. 7 Sqdn., Worthy Down, to command, 15.12.29. R. E. Saul, D.F.C., to School of Army Co-operation, Old Sarum, to command, 1.1.30. T. L. Leigh-Mallory, D.S.O., to Special Duty List, for duty as Instructor at Staff College, Camberley, 1.1.30. C. O. F. Modin, D.S.C., to H.Q., Coastal Area, for duty as Fleet Aviation Officer to Commander-in-Chief, Atlantic Fleet, 3.1.30. N. H. Bottomley, A.F.C., to R.A.F. Depot, Uxbridge, 6.1.30. A. T. Harris, O.B.E., A.F.C., to H.Q., R.A.F. Middle East, for Air Staff duties, 3.1.30.

Squadron Leaders: J. H. D'Albiac, D.S.O., to No. 22 Group H.Q., Farnborough, 14.12.29. W. E. G. Bryant, M.B.E., to Station H.Q., Hornchurch, 14.12.29. D. Colyer, D.F.C., to Special Duty List, for duty with the Latvian Government, 1.1.30. H. W. L. Saunders, M.C., D.F.C., M.M., to H.Q., Air Defence of Gt. Britain, Uxbridge, 14.12.29. C. E. H. Medhurst, O.B.E., M.C., to No. 4 Sqdn., S. Farnborough, 1.1.30. F. H. Coleman, D.S.O., to No. 101 Sqdn., Andover, 3.1.30. J. H. O. Jones, to Station H.Q., Mount Batten, 22.12.29. H. W. Woollett, D.S.O., M.C., to R.A.F. Depot, Uxbridge, 4.1.30. T. P. Y. Moore, to R.A.F. Depot, Uxbridge, 18.12.29.

Flight Lieutenants: J. A. Elliott, to H.Q., Aden Command, 30.12.29.

R. H. Carter, R.A.F. Base, Calshot, 5.12.29. M. C. Pascoe, to No. 201 Sqdn., Calshot, 6.1.30. H. G. Crowe, M.C., to R.A.F. Depot, Uxbridge, 14.12.29. F. H. E. Reeve, to No. 4 Sqdn., S. Farnborough, 14.12.29. J. G. Walser, M.C., to No. 23 Group H.Q., Grantham, 14.12.29. W. M. Yool, to Air Ministry (D.C.A.S.), 1.1.30. J. A. McDonald, to Air Ministry (Signals Branch), 1.1.30. V. H. Tait, to R.A.F. Depot, Uxbridge, 1.1.30. C. McM. Laing, M.C., A.F.C., to No. 100 Sqdn., Bicester, 31.12.29. E. I. Bussell, to R.A.F. Depot, Uxbridge, 29.12.29. W. H. Markham, to No. 216 Sqdn., Middle East, 3.1.30. V. B. Bennett, to Special Duty List, for duty as A.D.C. to the Viceroy of India, 3.1.30. R. J. Sanceau, to No. 33 Sqdn., Eastchurch, 21.12.29. D. Macfadyen, to Air Ministry (D.D.P.), 19.12.29. H. P. Lloyd, M.C., D.F.C., to No. 2 Flying Training School, Digby, 1.1.30. G. G. Walker, to Station H.Q., Manston, 15.12.29. C. S. Riccard, to R.A.F. Base, Calshot, 5.12.29. A. J. Rankin, A.F.C., to No. 70 Sqdn., Iraq, 3.1.30. D. L. Evans, M.C., D.F.C., to H.Q., R.A.F., Middle East, 3.1.30. R. A. A. Cole, to No. 502 Sqdn., Aldergrove, 5.12.29. R. W. E. Bryant, to No. 14 Sqdn., Palestine, 3.1.30.

Flying Officers: H. J. Brown, to Night Flying Flight, Biggin Hill, 14.1.30. K. E. Parker, to R.A.F. Depot, Uxbridge, 10.12.29. H. J. Maughan, to No. 24 Sqdn., Northolt, 19.12.29. G. P. Macdonald, to No. 8 Sqdn., Aden, 30.12.29. G. E. E. Singleton, to R.A.F. Depot, Uxbridge, 5.12.29. C. H. R. Little, to R.A.F. Depot, Uxbridge, 3.12.29. R. R. Bennett, to No. 2 Sqdn., Manston, 1.1.30. P. V. Williams, to No. 5 Flying Training Sch., Sealand, 30.12.29. A. D. Gillmore, to No. 3 Sqdn., Upavon, 1.1.30. J. C. K. Rogers, to No. 202 Sqdn., Malta, 3.1.30. R. C. Field, to No. 208 Sqdn., Middle East, 3.1.30. W. H. Merton, to Sch. of Photography, S. Farnborough, 6.1.30.

BRITISH STRENGTH IN AIRCRAFT

THE daily press has lately been quoting lists of figures, issued by the Air League of the British Empire, which give the strength of various nations in service aircraft, divided into first line and reserve machines. The table is as follows:—

	First Line.	Reserve.	Totals.
France ..	1,730	3,000	4,730
U.S.A. ..	1,463	350	1,813
Italy ..	840	800	1,640
Great Britain ..	772	520	1,292
Japan ..	500(Army)	Not	572
	72(Navy)	known	

We have no means of telling how these figures are arrived at. It is particularly difficult to estimate the numbers of reserve machines, and as regards Great Britain, the attempt does not seem worth the trouble. The latest Air Force list shows that in this country there are 35 squadrons whose war establishment is 12 first-line machines apiece, though all are not up to establishment. There are five squadrons with an establishment of 10 machines apiece, and two flying-boat squadrons whose establishment is not yet settled, but which may be counted as having six machines each. There are also 24 flights of the fleet air arm (some of them stationed overseas) with an establishment of 6 machines each. It is doubtful whether these should be counted as adding to the strength of Great Britain, or of the Empire overseas. In Great Britain there are also eight flying schools and six

odd flights, as well as two squadrons stationed at Martlesham, whose machine strength ought not to be counted as adding to the fighting strength of the country. This gives the following result:—35 squadrons with 12 machines each, 420; 5 squadrons with 10 machines each, 50; 2 squadrons (flying boats) with 6 machines each, 12; 24 flights with 6 machines each, 144; total, 626.

If one counts British air strength overseas, one should reckon the air forces of Canada, Australia, South Africa and New Zealand, as well as the strength of the R.A.F. in the Middle East, Iraq, India, Aden and the Far East. It is, however, not easy to compute the machine strength of the Dominion forces. The figures for the R.A.F. overseas are:—17 squadrons with 12 machines each, 204; 2 squadrons with 10 machines each, 20; 3 squadrons (flying boats) with (say) 5 machines each, 15; total, 239.

Total machine strength, excluding schools and Dominion forces, 865.

As regards foreign nations, we have reason to believe the following tables to be approximately correct:—

France.—135 Army flights with 9 machines each, 1,215; 15 Naval units with 9 machines each, 135; total, 1,350.

United States.—Army first line, training, and reserve, 1,110; Navy first line, training, and reserve, 1,030; total, 2,140. Of these only about 900 are first-line machines.

Italy.—First-line machines, ready for war, over 1,000; reserves, about 800; total, 1,800.

"FLIGHT"

It is very seldom that we have seen a film with such a complete lack of glaring technical errors, as is the case with the latest product of the U.S. called "Flight."

As its name suggests it is essentially a film about flying, and the producers have been fortunate in securing the co-operation of the U.S. Marine Corps, and apart from a few flights on a Curtiss Fledgling the majority of the flying is by a squadron of Curtiss "Falcon's" (type OC—I) with 425 h.p. Pratt and Whitney "Wasp" engines.

Throughout there is an astonishing lack of anything that any other than the most critically minded person could cavil at, and instead of, as is so often the case with flying films, having a story which is sheer "bunk," the story woven in is really sound and perfectly plausible. One must make allowances for the relationship of the various ranks in U.S. Marine Corps, which does not, of course, quite tally with our own, but after doing so, one is left with the feeling that it is one of the finest films one has seen from every point of view. The acting is really good, and in many parts it is distinctly better than most films, which rely solely on acting for their appeal; the love interest—again allowing for the American temperament—is sensible and well done; and the flying is superb.

Formation flying has always been set at a high standard by the Marine Corps, and it is here seen at its best; particularly fine is a picture of the squadron taking off at night by the aid of a portable floodlight; and later there are such scenes as a landing and subsequent take-off in the bush, and finally a landing with only one wheel. These may have been faked up, but if so they were extraordinarily well done.

The story is made up round a small guerilla war with a bandit leader in Nicaragua, which supplies just the right amount of "blood and thunder," and a death scene after a crash is quite one of the best representations of this we have seen.

The photography from the air both of the formation flying and the surrounding scenery is very fine, but the reproduction of the sound (Western Electric Co.) has still a long way to go before it can compare with the technique of the photography, that is not to say, that it is not far better than it was a few months ago, but at the same time it leaves one thinking that it is a pity that it is not better.

"Cirrus" Dis-Appointments

In writing of the appointment of Major Stewart and Mr. Peak as joint general managers of Cirrus Aero Engines, Ltd., last week, a printer's error caused us to state that Major Stewart would look after the Regent Street office end of affairs. Lest readers should assume that the company has moved, it should be pointed out that the statement was intended to read "Regent House," and not "Regent Street," the address of Cirrus Aero Engines and A.D.C. Aircraft being, of course, Regent House, Kingsway. At the same time, we referred to Capt. Walker as works manager at Waddon. This should have been works superintendent, Mr. Olney being, as is well known, the works manager.

Goggles!

THOSE who are thinking of investing in goggles, whether for use in the air or on land, will do well to have a look at the special display which E. B. Meyrowitz are having during the next two weeks at their showrooms in Old Bond Street.

R.A.F. SPORT

Harriers.—B. C. V. Oddie retained the 5 miles cross-country championship of the Air Ministry Harriers in the race which was run in the Motttingham (Kent) country on January 8. Thirteen started and all finished. Oddie's time was 30 mins. 44 secs.

Association Football.—On January 8 the R.A.F. Soccer XI, which had just returned from a tour in Jersey, defeated Middlesex County at Wealdstone by 2 goals to 1. Corpl. Baldwin, the R.A.F. left half-back, was injured early in the second half and had to leave the field; while Aircraftman James, their left back, was also partially crippled. Aircraftman Chaston (goal), Corporal Pond (back), Aircraftman Oates (forward), and Education Officer C. H. Sleight-holme (centre forward) played very well. The goals were both scored by Oates. Next day at St. Albans the R.A.F. XI were beaten by a F.A. team by 6 goals to 1. Baldwin was not playing.

Rugby Football.—On Saturday, January 18, Bristol beat the R.A.F. XV at Horfield by one try and two penalty goals (9 points) to one goal (5 points). At first the R.A.F. seemed to be the better side, and their outsiders were frequently dangerous. Flight-Lieut. Odbert, the old Irish international, scored after a splendid run, and Pilot Officer Llewellyn kicked a goal. Then Collins kicked a penalty goal for Bristol, Burland scored a try, and finally Hazell kicked another penalty goal, all in the first half. There was no scoring in the second half, but the R.A.F. were on the defensive most of the time. A great number of free kicks was given against the service. Any side which is constantly infringing the rules, and which allows two penalty goals to be scored against it, deserves to lose the match. The R.A.F. XV must reform its ways if it wishes to put up a good show in the inter-service matches.

The teams were:—

Bristol.—T. W. Brown, back; K. Dowling, D. W. Burland, M. McGouganl and W. C. Edwards, three-quarter backs; C. B. Carter and E. T. Collins,

half-backs; J. W. Hazell, B. Parsons, W. C. Broome, C. Smith, F. O'Neill, F. J. Coventry, Dr. K. Pridie, and W. Bryant, forwards.

R.A.F.—Pilot Officer Nicholson, back; Flying Officer Hodder, Flight Officer Pott, Pilot Officer Llewellyn, and Flight Officer Cotton, three-quarter backs; Flight-Lieut. Odbert and Flying Officer Maclean, half-backs; Pilot Officer Williams, Flight-Lieut. Beamish, Sergeant Kirby, Pilot Officer Constantine, Flight-Lieut. Franks, Sergeant Hall, Lance-Aircraftman Maxwell, and Pilot Officer Letchworth, forwards.

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The Model Aircraft Club. (T.M.A.C.)

ARRANGEMENTS have been made for a debate between two well-known aero-modellists to be held at the Junior Institution of Engineers, 39, Victoria Street, Westminster, S.W.1, on Wednesday, February 19, at 7 p.m. prompt, the subject being Heavy-Weight Model Aeroplanes *versus* Light-Weight Model Aeroplanes Rubber Driven.

To defray the cost of hiring the lecture room a charge of 6d. per head will be made.

Another interesting debate is being arranged for March 19, full particulars to be published next week.

Will all members take note of the above dates and make a special effort to be present.—A. E. JONES, Hon. Sec., 48, Narcissus Road, West Hampstead, N.W. 6.

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PUBLICATIONS RECEIVED

Aeronautical Research Committee Reports and Memoranda:
No. 1256 (Ae. 405).—The Distribution of Pressure over a section of an Airscrew Blade in Flight, and the Variation of Lift Coefficient with the Speed of the Section. By E. T. Jones, February, 1929. Price 1s. 3d. net. No. 1259 (Ae. 408).—Theoretical Relationship for a Wing with Unbalanced Ailerons. By A. S. Hartshorn. April, 1929. Price 9d. net. No. 1254 (Ae. 403).—Part I. A Method of Calculating Suitable Airscrew Characteristics to Meet Given Conditions. Part II. A Comparison of the Observed Change of Performance Consequent on a Change of Airscrew and the Change Predicted by the Methods of Part I. By R. S. Capon. June, 1929. Price 2s. net. H.M. Stationery Office, Kingsway, London, W.C.2.

Amendment List, No. 6 to Air Publication 1208. Airworthiness Handbook for Civil Aircraft. Part I: Aeroplanes; Inspection Leaflet 135. November, 1929. H.M. Stationery Office, London, W.C.2. Price 1d. net.

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AERONAUTICAL PATENT SPECIFICATIONS

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